BULLETIN OF THE
SCHOOL OF EDUCATION
INDIANA UNIVERSITY

Vol. V BLOOMINGTON, INDIANA No. 6

JULY, 1929

Entered as second-class mail matter September 30, 1924, at the postoffice at Bloomington, Indiana, under the Act of August 24, 1912. Published six times a year from the University Office, Bloomington, Indiana.

Sixteenth Annual Conference on Educational Measurements

Held at Indiana University
April 19 and 20, 1929

Bureau of Cooperative Research, Indiana University School of Education
HENRY LESTER SMITH, Director

Price, 50 cents. For sale by the University Bookstore, Bloomington, Ind.

A limited number of copies of this bulletin will be distributed free of charge to citizens of Indiana.

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Table of Contents

Page

PROGRAM OF CONFERENCE ON EDUCATIONAL MEASUREMENTS 5

SOME FINANCIAL PHASES ON THE ESTABLISHMENT AND SUPPORT OF THIRTY REPRESENTATIVE PUBLIC JUNIOR COLLEGES IN SIX CENTRAL STATES OF THE UNITED STATES, Earl A. Johnson, Special Fellow in the School of Education, Indiana University 7

MEASURING THE WORK OF THE HIGH SCHOOL, Allan T. Stanforth, Assistant Professor of Education, Indiana University 14

EDUCATION FOR WORLD FRIENDSHIP AND UNDERSTANDING, Henry Lester Smith, Dean of the School of Education, Indiana University 23

A STUDY OF CERTAIN PROBLEMS DEALING WITH SCHOLASTIC ACHIEVEMENT IN A TEACHERS COLLEGE, John William Jones, Director of Research, Indiana State Teachers College, Terre Haute 33

NEW-TYPE TESTING AND SOME CRITICAL EVALUATIONS, Wendell W. Wright, Professor of Education, Indiana University 41

EDUCATION AND THE NEW WORLD, Melvin E. Haggerty, Dean of the School of Education, University of Minnesota 49

APTITUDE TESTS FOR TEACHERS, Frances Dearborn, Professor of Education, Indiana State Teachers College, Terre Haute 62

TRADE TESTS, George K. Wells, Assistant Vocational Director, State Department of Public Instruction, Indianapolis 69

PSYCHOLOGICAL TESTS IN BALL TEACHERS COLLEGE, Robert C. Scarf, Assistant Professor of Education, Ball Teachers College, Muncie 72

A REPORT ON THE LATE DR. H. G. CHILDS' STUDY OF FACTORS ENTERING INTO SUCCESSFUL TEACHING, Carl G. F. Franzén, Professor of Secondary Education, Indiana University 76

THE USE OF TEACHER RATING AT PURDUE UNIVERSITY AND ITS IMPLICATIONS FOR THE ELEMENTARY AND SECONDARY SCHOOLS, George C. Brandenburg, Professor of Education, Purdue University, Lafayette 77

THE IMPROVEMENT OF COLLEGE EDUCATION. Melvin E. Haggerty, Dean of the School of Education, University of Minnesota 84

PROGRAM OF CONFERENCE ON EDUCATIONAL MEASUREMENTS

April 19 and 20, 1929

First Session, Friday, 10:00 a.m.

Ralph W. Noyer, Dean of Ball Teachers College, Muncie, presiding.

10:00. The Costs of Education in Representative Public Junior Colleges in the North Central States. Earl A. Johnson, Special Fellow in the School of Education, Indiana University.

10:30. Measuring the Work of the High School. A. T. Stanforth, Assistant Professor of Education, Indiana University.

11:00. The Present Practice in the United States in Teaching Children World Friendship. H. L. Smith, Dean of School of Education, Indiana University.

Second Session, Friday, 2:00 p.m.

George L. Roberts, Head of the Department of Education, Purdue University, Lafayette, presiding.

2:15. A Study of Certain Problems dealing with Scholastic Achievement in a Teachers College. John William Jones, Director of Research, Indiana State Teachers College, Terre Haute.

2:45. New Type Testing and Some Critical Evaluations. Wendell W. Wright, Associate Professor of Education, Indiana University.

3:15. Education and the New World. M. E. Haggerty, Dean of School of Education, University of Minnesota.

Dinner Session, Student Auditorium, Friday, 6:00 p.m.

(Make reservations before 3:00 p.m. Friday.)

Melvin S. Lewis, Associate Professor of Education, Indiana University Toastmaster.

6:45. Aptitude Tests as Predictive Values in Teaching. Frances Dearborn, Professor of Education, Indiana State Teachers College, Terre Haute.

7:00. Trades Tests. George K. Wells, Assistant Vocational Director, State Department of Public Instruction, Indianapolis.

7:15. Psychological Tests in Ball Teachers College. Robert Scarf, Assistant Professor of Education, Ball Teachers College, Muncie.

Fourth Session, Friday, 8:00 p.m.

H. L. Smith, Dean of School of Education, Indiana University, presiding.

8:00. Literature and the New Education. M. E. Haggerty, Dean of School of Education, University of Minnesota.

Fifth Session, Saturday, 9:30 a.m.

Professor Earl C. Bowman, Department of Education, DePauw University, Greencastle, presiding.

9:30. A Report on the late Dr. H. G. Childs' Study of Factors Entering into Successful Teaching. Carl G. F. Franzén, Professor of Secondary Education, Indiana University.

10:00. The Use of Teacher Rating at Purdue University and Its Implications for the Elementary and Secondary Schools. George C. Brandenburg, Professor of Education, Purdue University, Lafayette.

10:30. Men, Women, and Children. M. E. Haggerty, Dean of School of Education, University of Minnesota.

Some Financial Phases on the Establishment and Support of Thirty Representative Public Junior Colleges in Six Central States of the United States

EARL A. JOHNSON, Special Fellow in the School of Education, Indiana University

THE writer wishes to express his appreciation to President William Lowe Bryan, whose interest in the junior college field made this study possible; to Dean H. L. Smith, of the School of Education, whose careful supervision and guidance from the initial point in the planning of the study to its completion has been of immeasurable value; to Leo M. Chamberlain, formerly of the Bureau of Coöperative Research of the School of Education and now in the College of Education, University of Kentucky, whose friendship and assistance materially lightened the burden of the field work; and to the officials in the thirty school systems whose coöperation made this study possible.

The junior college has been defined in many instances as an institution which offers work "equivalent in prerequisites, scope, and advancement to the work done in the first two years of a standard college or university." The junior college discussed here will be limited to that type of institution which is publicly supported and maintained as an integral part of the public school system which attempts to offer work equivalent in prerequisites, scope, and advancement to the work done in the first two years of a standard college or university. Emphasis should be placed on the fact that, while many are attempting, several are failing to offer work equivalent in all respects to that done in the standard university.

The public junior colleges may be classified as follows: (1) those which offer the required academic courses of the first two years of a four-year liberal arts course, and (2) those which offer a number of elective and basic courses for specialized professions, as well as the regular required academic courses. Thruout Michigan and Minnesota and predominantly in Illinois the latter view is taken, while in Missouri, Kansas, and Iowa the first type is in greater abundance.

This report is confined to data collected from thirty representative public junior colleges of six midwestern states, namely, Michigan, Minnesota, Iowa, Kansas, Missouri, and Illinois. They ranged in size in 1927-28 from an enrollment of 18 to an enrollment of 702, the median size of enrollment being 107. Dr. F. L. Whitney found that the median for the 147 public junior colleges in the United States was 108 for this same year. The total enrollment in the 30 junior colleges was 4,228, or 16.91 per cent of the total enrollment of 25,000 for all public junior colleges in the United States.

The junior colleges in our neighboring states are, with two exceptions, housed with the regular high school or with the junior high school. There are some advantages pointed out in housing the junior college with the junior high school, the most prominent of which is that the difference in years between the students in the junior college and those in the junior high school prevents disciplinary problems which might otherwise occur, and that it prevents administrative jealousies which might exist between the dean of the junior college and the principal of the senior high school.

The junior college situation cannot be discussed without emphasizing the wide range of differences between the different institutions. Some of the following are very noticeable.

The true valuation of taxable property in the thirty districts ranged from $1,352,060 to $329,282,012, while the median was $22,000,000. The value of taxable property per student enrolled in the public schools, including junior college students, ranged from $1,620.50 to $23,794.30, while the median was $6,000. The cost of the buildings in which the junior colleges were housed ranged from $53,000 to $3,927,325, while the median was $350,000. The value of the laboratories were as varied as those differences indicated above. One junior college was offering chemistry in an $800 chemistry-physics laboratory, while another had $14,500 invested in chemistry equipment alone. The median chemistry laboratory layout was appraised at $3,400. In physics, the $800 chemistry-physics laboratory was the smallest in value while $15,000 was the largest. These junior colleges were in school systems ranging in total enrollment from 505 to 29,533. They were attached to high schools whose enrollment ranged from less than 160 to more than 2,000. It is true that the number of students served is an important factor in each of these differences, but it was obvious that the difference in the number served was not in proportion to the differences just stated.

These data indicate the fact that each junior college had characteristics which made it unlike the others in the group and that only the best of standards strictly recognized by each institution can produce a type of instruction equivalent in scope and advancement to the work of the standard college or university. It also emphasizes the fact that in legalizing junior colleges, care should be taken to make it impossible for small communities with small high schools to establish junior colleges, or ambitious local organizations to force upon the community a junior college that should not exist.

Since the junior college in almost every case was so closely integrated with the high school, some device had to be used for separating the current educational expenditures properly belonging to the junior college. Many administrators of junior colleges contend that the only additional expense connected with the junior college is for teacher salaries. They claim that the building operation and maintenance is no more and that room utilization is better with the junior college. This argument is valid in some cases, but when the high school enrollment becomes greater and a new building program must be initiated, the junior college causes the need to be felt earlier than it otherwise would be. Dr. O'Brien, of the University of Kansas, and several others claim

that the junior college should receive its share of the responsibility for current expenditures in administration, operation, maintenance, and auxiliary agencies. For this reason general administrative expenditures and general auxiliaries were allocated on the basis of enrollment, while operation and maintenance were allocated on the basis of actual space used by the junior college. All expenditures that were not shared were charged directly to the junior college.

It was found that the current per capita educational expenditures for senior high school and junior college, based upon average daily attendance for the school year 1927-28, were as follows:

TABLE I—CURRENT EDUCATIONAL EXPENDITURES PER PUPIL IN AVERAGE DAILY ATTENDANCE IN THE JUNIOR COLLEGES AND SENIOR HIGH SCHOOLS OF THE THIRTY JUNIOR COLLEGE DISTRICTS.

School Number	Current Educational Expenditure per High School Student in Average Daily Attendance	Current Educational Expenditure per Junior College Student in Average Daily Attendance	Per Cent Junior College was of High School Expenditure
10	$ 90.70	$136.44	150.43
7	100.79	138.94	137.85
4	103.66	140.06	135.11
16	104.99	159.01	151.45
6	116.34	159.07	136.73
18	105.20	165.76	157.56
5	118.92	166.45	139.96
28	105.71	186.31	176.24
13	124.10	188.06	151.54
8	106.20	189.60	178.53
15	114.50	193.58	169.06
27	144.08	201.84	140.09
14	111.47	215.57	193.38
9	118.54	222.94	188.07
30	169.20	226.67	133.96
26	144.16	230.08	140.09
12	99.85	230.87	231.21
3	85.78	231.99	270.44
11	102.86	241.31	234.6
29	128.34	263.46	205.28
1	220.51	275.62	124.99
19	159.57	285.26	178.76
17	133.03	293.94	220.96
24	238.02	294.91	123.90
22	246.97	319.20	129.25
25	155.11	355.06	228.9
2	181.14	359.95	198.71
20	232.96	376.62	161.66
23	208.77	397.93	190.42
21	278.62	416.17	149.37
Mean	158.60	232.26	146.44
Median	121.51	228.37	160.36

In 19 of the 30 institutions the per capita current expenditures for junior college were over 50 per cent greater than the per capita current expenditures in the regular high school, and in six they were more than 100 per cent greater. In only two schools were they less than 25 per cent greater than the per capita current expenditures for high school.

On the basis of enrollment, the per capita differences between high school and junior college were slightly less since, in the high school, the average daily attendance as compared with enrollment was somewhat higher than it was in the junior college. Several factors entered in to cause students of the junior college to withdraw. Some of the most important were: (1) The junior college was used by many as a place to attend until work could be secured. (2) Many used it as an experiment to determine whether or not they liked college or could be successful in college work. (3) In most of the junior colleges the general process of elimination on account of failure worked much as it does in the standard college or university.

The current educational expenditures based upon enrollment showed an average of $200.17 per capita in junior college as compared with an average of $138.87 in the regular high school, or an average of 44.14 per cent greater. But here, again, in 15 of the 30, the per capita expenditure for junior college was more than 50 per cent greater than that for the high school, in three colleges the current expenditures were more than 100 per cent greater, and in five colleges the current expenditures were less than 25 per cent greater than the regular high school per capita expenditures.

Tuition fees made up a very small portion of these expenditures. One school charged a yearly tuition fee of $250; 11 charged from $100 to $150; of the remaining 18, 8 charged none and 10 charged from $40 to $60 for the full year. The tuition problem was difficult to solve since those that came in from outside the school district, if requested to pay more than the regular rate, oftentimes attempted or were able to prove themselves in legal residence. Opinion was prevalent that tuition charges should be discontinued and state aid should be substituted. Fees and local taxation were the major sources of support in these 30 institutions.

The reasons for the increased per capita cost in junior college were: (1) Higher salaries were paid to junior college teachers. (2) The average number of periods of classroom instruction per week for full-time junior college instruction was 15.2, while the average number of periods for the full-time senior high school instruction was 24.7. (This caused a much smaller pupil load in the junior college.) (3) The libraries were enlarged. (4) Supplies for the special subjects were greater. (5) Additional social facilities were furnished for junior college students. (6) Room utilization was not so effective in the junior college space. (7) Special administrational and supervisory expenses per pupil were higher.

The average annual salary for full-time junior college instructors was $2,419.66; for part-time high school and junior college instructors, $2,352.22; and for full-time senior high school instructors, $2,045.29. This does not include the salaries of the deans, principals, or athletic coaches.

The junior college took the best trained teachers from the high

school. In academic training, 88.32 per cent of the full-time junior college instructors had one year or more of graduate work; while of the full-time high school instructors, 18.2 per cent had one year or more of graduate work. Of the full-time junior college instructors, 86.98 per cent, 56.92 per cent of the part-time instructors, and 10.91 per cent of the full-time high school instructors had advanced degrees. The average length of experience of the full-time junior college instructors was 12.7 years; of part-time junior college instructors, 11.18 years; and full-time high school instructors, 10.03 years. The median for each group was 10.75 years, 9.6 years, and 8.88 years, respectively.

The current expenditure for instruction for the various groups of subjects per student clock hour were as follows:

TABLE II—MEAN AND RANGE OF EXPENDITURES FOR INSTRUCTIONAL SALARIES IN EACH OF THE SUBJECTS PER STUDENT CLOCK HOUR IN THE THIRTY JUNIOR COLLEGES.*

SUBJECT	Mean Cost for Instruction Per Student Clock Hour	Range in Cost for Instruction Per Student Clock Hour	Number of Schools Offering This Subject
English I and II	$0.2294	$0.076 –$0.3916	30
History	.2298	.058 – .5198	30
Education and Psychology	.2300	.1064 – .7582	24
Spanish	.2578	.1332 – 1.358	13
French	.2624	.1512 – .6756	30
Commercial (Stenography and Typewriting)	.2662	.2416 – .344	3
Zöology	.2802	.1052 – .7406	13
Geography	.2822	.1902 – .3298	4
English III and IV	.2830	.1048 – .6612	23
Economics, Political Science, Sociology, etc	.2948	.0674 – .8268	19
Physical Education	.3080	.0448 – .4784	11
Geology	.3202	.2282 – .8042	3
German	.3206	.1356 – 1.76	11
Comparative Anatomy and Physiology	.3282	.224 – .7986	4
Botany	.3384	.0992 – .7788	10
Biology	.3402	.235 – .6322	10
Accounting	.3470	.185 – .7406	6
Astronomy	.3520	.3352 – .3668	2
Chemistry	.3542	.1334 – .9294	30
Art	.3616	.2514 – .4780	3
Mathematics	.3926	.1096 – .6734	30
Physics	.3930	.1732 – 1.666	18
Shop	.4224	.2176 – 1.678	9
Philosophy and Logic	.4898	.2968 – .8334	3
Engineering, Drawing	.5128	.1662 – 1.857	15
Special Music	.5312	.292 – .8546	6
Home Economics	.5519	.359 – .7246	3
Latin	.7130	.389 – 1.33	6
Journalism	.7288	72.88	1

*Table II shows the different groups of subjects, the mean expenditure for instructional salaries per student clock hour, the range of expenditures per student clock hour for instructional salaries, and the number of colleges which offered the subject. For example, English I and II had a mean expenditure of $.2294 per student clock hour, the range was from $.076 to $.3916, and it was offered in all 30 of the junior colleges. Journalism was offered in only one college and the expenditure for instructional salaries was $.7288 per student clock hour.

TABLE III—MEAN EXPENDITURE PER STUDENT CLOCK HOUR FOR INSTRUCTIONAL SALARIES IN THE SUBJECTS WHICH WERE OFFERED IN FIFTEEN OR MORE OF THE JUNIOR COLLEGES.

		Schools
English I and II	$0.2294	30
History	.2298	30
Education and Psychology	.2300	24
French	.2624	30
English III and IV	.2830	23
Economics, Sociology, and Political Science	.2948	19
Chemistry	.3542	30
Mathematics	.3926	30
Physics	.3930	18
Engineering, Drawing	.5128	15

Many of the schools offered only one course in language, one course in mathematics, one course in history, and only one year of science. As was shown in the preceding table, per student hour costs cover a wide range, being dependent on the salary of the teacher and size of the class. The more courses that are offered the smaller will be the size of the classes. If the small college attempts to offer a great variety of courses, the classes become so small that the cost becomes prohibitive.

Reclassifying the colleges into groups on the basis of variety of courses offered and building facilities, they may be grouped as follows:

Group I. First class junior college. Six colleges.
Group II. Average or above, but lower than group I. Nine colleges.
Group III. Poor to average. Nine colleges.
Group IV. One-year junior colleges. Six colleges.

TABLE IV—MEAN AND RANGE OF CURRENT EDUCATIONAL EXPENDITURES IN THE THIRTY JUNIOR COLLEGES CLASSIFIED ON THE BASIS OF VARIETY OF COURSES OFFERED AND TEACHERS' SALARIES.*

Group	Range in Enrollment	Mean Enrollment	Range in Per Capita Current Educational Expenditures	Mean Per Capita
I	62 to 702	262	$201.84 to 416.17	$278.04
II	47 to 348	176	138.94 to 397.93	207.98
III	45 to 135	83	140.06 to 241.31	181.27
IV	18 to 148	54	136.44 to 293.94	239.48

*Interpretation: Group I containing the junior colleges ranked as the best, had junior colleges ranging in size from 62 to 702, while the mean enrollment was 262. The range in per capita expenditure was from $201.84 to $416.17 while the mean was $278.04.

Several reports show that the junior college enrollment will probably be about 10 per cent of the total enrollment in the high school, that about 50 per cent of the senior class in high school will continue in junior college, and that about 50 per cent of the freshman class will

continue in the sophomore class in the junior college. In this investigation 45.62 per cent of the preceding senior classes in high school continued in junior college, while 44.92 per cent of the freshman classes in 1927-28 enrolled in the sophomore year in 1928-29. From these figures, it would be expected that, in a city of 2,500 enrolled pupils in the last four years of high school, there will probably be an enrollment of 250 in the junior college. Unless unusual financial conditions are present, such as the natural wealth of the range cities of Minnesota, school systems of less than 1,750 enrolled pupils in the last four years of high school should consider very carefully the entire problem before attempting to establish junior colleges. Of the six colleges listed as the best in this paper, four had over $10,000 true property valuation per enrolled pupil. Of the eight listed as poor to average, only one had a true property valuation per enrolled pupil of over $5,000.

Junior colleges are not established and maintained without extra effort on the part of the community. It takes effort on the part of the administration to get students to attend, and the effort expended is in direct proportion to the facilities of the college itself. Any state that makes it possible for small communities that have difficulty in maintaining a regular high school to establish junior colleges must expect to see the students of these small colleges failing to get their credits accepted by higher institutions and to see a reactionary movement following, in which colleges in existence are discontinued and the whole movement hindered. The state should have proper standards for the college and observe them rigidly. The junior college is a worthy institution and looked upon with favor by higher institutions when it has facilities which are conducive to doing work of college grade.

Measuring the Work of the High School

ALLAN T. STANFORTH, Assistant Professor of Education, Indiana University

MY topic as listed on the program this morning is "Measuring the Work of the High School." Perhaps it would be more fitting if it were to read, "How Shall We Measure the Work of the High School?"

Most of you, who are connected in some capacity with high schools, doubtless are justified in feeling that your high school is doing good work. May I ask how you know that this is true? What evidence do you have to support this conviction?

Science claims that whatever exists in any amount can be measured. If your high school is doing efficient work, how may this efficiency be measured in order that mere opinion may be supported by facts? Shall we measure it by the success of our graduates and the fame of our alumni, by the amount of promotion and failure among our students, by the size of our enrollment, or by the amount of money spent in the schools for teachers' salaries and equipment? Shall we measure the efficiency of the school by the size and cost of the building, the tax rate, the beauty of the campus, or the number of college degrees possessed by the teachers? May we judge the high school by the number and variety of subjects offered in the curriculum and by a wide range of extra-curricular activities? Does the size of the school gymnasium or the success of the school's athletic teams have anything to do with the school's efficiency, or shall we judge its success by an imposing and expensive school annual, or its weekly newspaper?

Doubtless all these items do have something to do with a school's success and failure, but isn't it about time to apply some sort of a measuring rod to the work of the school? Most of us are agreed that the work of the school should be measured. We are not agreed as to how this may be done, nor are we agreed as to the sort of material which should enter into the construction of the measuring rod.

Several attempts have been made to measure the work of the schools. In 1920 the Russell Sage Foundation published a monograph by Leonard P. Ayres, entitled, *An Index Number for State School Systems*. The data used were taken from publications of the United States Bureau of Education. Dr. Ayres constructed an index consisting of ten points which deal with school attendance and school costs and which are as follows:

1. Per cent of school population attending school daily.
2. Average days attended by each child of school age.
3. Average number of days the schools were kept open.
4. Per cent that high school attendance is of total attendance.
5. Per cent that boys are of girls in the high school.

6. Average annual expenditure per child attending.
7. Average annual expenditure per child of school age.
8. Average annual expenditure per teacher employed.
9. Expenditure per pupil for purposes other than teachers' salaries.
10. Expenditure per teacher for salaries.

The Ayres index was used widely for several years. It has certain weaknesses, however, as a measuring instrument. Five of the factors in the Ayres index are educational in character and five are financial. Why should so much stress (50 per cent) be placed on what education costs? An example of the unfair influence of the financial factors in the index is found in a comparison of the ranking of the two states of Montana and Oregon in 1918. Montana ranked first and Oregon twentieth. Omitting the financial factors of the index and computing on the basis of education alone, Oregon has an index number of 66+, and Montana, 63+. It appears that Oregon ranks higher in the educational factors, but because it costs Montana more for a less degree of educational excellence, Montana gets a much higher score. Again, the items in the Ayres index are each given equal weight. Many factors by which efficiency might be measured are omitted. However, this was one of the first scientific attempts to measure the work of school systems.

The next attempt toward measuring the work of a school system was made by G. W. Frasier in 1922. In his study, which was published under the title, *The Control of City School Finances*, Dr. Frasier worked out an index for measuring the school's efficiency, in which no cost items were included. These items deal with the per cent of 16- and 17-year-old children in school, the size of classes, amount of playground space, training of teachers, adequate school buildings, and the per cent of the increased cost of living from 1913 to 1920 that was met by increased salaries for women elementary teachers.

In 1924 the Bruce Publishing Company issued a monograph by Frank M. Phillips, entitled, *Educational Ranking of States by Two Methods*. Dr. Phillips attempted to bring the Ayres ranking of the states up to date for the years 1918-1925. He also attempted a new ranking of the states according to ten points which were based upon school attendance, school costs, and educational opportunity.

In the remaining portion of my time, I shall try to describe an attempt which was made toward constructing an index of twenty factors. This index was used to measure the work of twenty-two high schools in the states of Ohio and West Virginia. The results of this study are not given here; only the index is described.

The weights given each of the various factors in the index were those assigned by a group of one hundred school superintendents and principals who were enrolled in graduate classes of the School of Education, New York University.

A real educational index number should take into account only the products of education. Since these products are largely unmeasurable at present, the best that we can do is to make use of those measurable factors that are associated with, and are the necessary corollary of, efficient education. The index discussed this morning may be considered

a measure of potential efficiency of the high school or a device by which we may analyze the work of the high school.

Factors Involved in the Construction of the Index

The index considered here is offered as a somewhat objective measure of several factors, which are associated with efficiency of organization and administration of instruction in the small high school. An attempt is made to set forth the chief points of weakness and strength of each of the various factors of the index.

1. What per cent of the total high school population is attending high school daily? Weight, 5. The accepted standard was 100 per cent.

The ages 14-20 years were selected so that the various schools considered might be placed on a comparative basis. The assumption was made that all children of high school age should have a perfect attendance. The per cent of attendance will be large in that high school which is efficiently organized and administered. The high school that is well attended is usually meeting community needs and is one that enjoys a large measure of community support and confidence. A large attendance indicates a measure of social life for the youth of the community. A low per cent of attendance indicates, at least to some extent, poor teaching and poor teachers.

This item of the index is weak when generally applied, in that no allowance is made for attendance at private and parochial schools and junior colleges. Consideration also should be given to the fact that many tuition pupils residing outside the school district may attend these high schools. The rate of acceleration and retardation should also be taken into consideration. Many pupils enter high school at the age of 12 years; many graduate at the age of 16. If the ages 14-20 years are placed as the limits for the high school population many pupils will thus escape consideration in this factor of the index.

It should also be remembered that many of these high school districts have no adequate census records of the high school population. In many of these smaller cities farmers often move from the farm to the city so that their children may attend the high school. They return to the farm at the close of the school year.

We should also remember that a community having a low attendance in high school may also have difficult economic and social problems.

Many of the above factors are involved in the measurement of item 1 in the index. However, the per cent of the total high school population attending high school daily in any community may be safely accepted as one measure of the school's potential efficiency.

2. Average number of days attended by each child of high school age (14-20). Weight, 7.

Two hundred days were selected as the proper length of the school year and item 2 was divided by 2 to reduce to a percentage basis and get the proper index for average days attended.

In an efficient, well organized high school the average daily attendance will probably be high. A large attendance indicates that the

youth of the community and their parents have confidence in the high school. A large attendance in the high school also indicates a large attendance in the upper grades. A large attendance is a measure of community support. On the other hand, the average daily attendance may be misleading. It would not show the effect of a large number of repeaters and failures. It would not show that the attendance might be largely made up of girls and that the work of the school was not suited to the needs of the boys, and vice versa.

Poor instruction and poor equipment might be found in a community where the habit of school attendance is strong. No allowance is made for attendance at other institutions on the secondary level. Neither is consideration given to the fact that many high school pupils might be attending because of the compulsory attendance laws. Again, some of the high schools may be conducting double sessions, because of overcrowding and other conditions.

3. What was the total number of days that school was kept open last year? Weight, 8.

Item 3 was also divided by 2 to reduce to a percentage basis. The standard was 200 days.

The length of the school year is one measure of financial support by the community. This information helps in comparing different schools. It gives some indication of the school time lost, since both Ohio and West Virginia have a minimum high school year of 180 days.

The validity of this item might be questioned on the ground that all high schools in both states must remain open 180 days (except dismissal for certain holidays) and that only one school out of the total of 22 had more than 180 days in the school year. Even a school doing the poorest kind of work would make a creditable showing in this factor.

4. What was the per cent last year that high school attendance was of total school attendance? Weight, 2.

Leaving out of consideration growth of population, one-third of the pupils should be in high school, if there are eight years of elementary school work and four years of high school, and, since the data are based on this assumption, item 4 was multiplied by 3.

A flourishing high school usually makes attendance in upper grades better. It also indicates that the holding power of the school is good. It shows that the transition from the upper grades to the high school is cared for in an acceptable way. A well attended high school provides the youth of high school age with social life and gives them a social attitude. It shows a favorable community opinion of the high school.

The weakness of this item of the index is apparent in that poor attendance thruout the entire system would not be clearly set forth. Poor attendance in the upper grades does not have proper recognition. Deaths that occur in the grades do not enter into consideration in this item. The number eliminated because of retardation, illness, working permits, poor teaching, and dissatisfaction with school work is not given proper consideration. Rapid growth of a community might operate to

give this item undue weight. Industrial expansion and depression also play a part in the consideration of this factor of efficiency.

5. Per cent that boys were of girls in the high school last year. Weight, 2.

Conceding an equal division of the sexes there should be an equal number of boys and girls in the high school. Therefore, no further computation is needed with this item. If the high school is meeting the needs of the community in an acceptable way and has the confidence of the community, a larger per cent of boys will remain in it for four years. High school work at present may not be better suited to girls, but our records of attendance show that girls attend in far greater numbers than boys. This may be due to the fact that most small communities offer fewer industrial and professional opportunities to girls. Athletics may serve as a means of holding boys in high school in some communities. Due allowance is not made for the nature of industrial conditions of a community in the general application of this factor.

6. Per cent of teachers who are graduates of standard colleges and have 20 or more hours of professional training. Weight, 6.

Most states accept this as a minimum standard (except the southern states, which accept a minimum of 12 semester hours of professional work for the training of teachers). These data help in comparing one school with another and give some measure of school policy.

Since most states have this requirement as a minimum standard, at least for a majority of the teachers in a high school, it does not permit proper recognition of that high school which sets up higher standards of teacher training. Neither does it indicate the character of this professional preparation. It does not show whether teachers received professional preparation in their special fields or not. This standard places a premium on college and university attendance, rather than on scholarship and teaching efficiency.

7. Per cent of pupils who attend school all day in adequate buildings owned by the city. (Portable buildings, annexes, basements, and rented buildings apart from the main building are not considered adequate.) Weight, 3.

We assume here that all pupils should attend school in adequate buildings. These data help measure community support and confidence in the high school. They may also provide a check on school growth and attendance. They indicate to some degree the character of instruction.

This factor does not make allowance for the fact that the plan of grouping buildings is used in some high schools. Good teaching may be had in poor buildings. Certain forms of high school work may well be carried on in separate buildings. Work such as manual training, domestic science, art, shop work, music, and physical training could possibly be carried on just as effectively in separate buildings as in the main building.

8. What was the per cent of the number composing last year's graduating class of the number who entered high school four years ago? Weight, 6.

This item was intended to secure a measure of the holding power of the high school, and we assumed that all who entered the high school should finish the work in four years. We get here a measure also of the efficiency of instruction, of retardation, and of elimination.

We must admit, however, that no recognition is given the fact that many high schools are organized on the six-year plan. Many pupils are transferred from other schools; many drop out and enter other educational institutions such as the junior college and the commercial school.

9. What per cent of the teachers have more than one year's teaching experience? Weight, 7.

We have no scientific evidence that inexperienced teachers might not do as efficient work as experienced teachers; school authorities are generally agreed, however, that some experience in teaching is desirable among applicants for teaching positions. The accepted standard score is 100 per cent. This item would seem to have validity from the fact that most institutions for the professional preparation of teachers insist on definite amounts of practice teaching.

10. What per cent of last year's graduating class are continuing their education in institutions of higher learning? Weight, 5.

The assumption is made that all high school graduates might well continue their education in institutions of college grade. This standard implies that the chief function of the higher institution is not the production of scholars. These data will also show whether or not the high school is inspiring its graduates for higher forms of education.

On the other hand, many authorities claim that not all the graduates of the high school should go to college; many are unfitted for it. Again the chief function of the high school is not preparation for college. This factor may ignore the effective work done by the high school in preparing its graduates for meeting the community's needs.

11. What per cent of the classes have less than 40 pupils enrolled? Weight, 2.

This factor gives general recognition to a belief among school authorities that large classes are wasteful and inefficient. Small classes give opportunity for individual help and instruction. The size of the classes also provides a check on the adequacy of the building program, on the number and size of the teaching force and load, on the extensiveness of the curriculum, and on pupil costs.

This standard ignores the fact that many high school classes, such as physical training, music, and certain lecture courses might well be given to large-size classes.

No allowance is made for efficient teaching of an exceedingly high order. It might be far more economical to employ highly efficient teachers at large salaries and have them instruct large-size classes than to employ less capable teachers for small classes.

The studies of Buckingham and Hudelson indicate that we need to be far less positive in our assertions concerning the dangers of large classes.

12. What is the ratio of pupil building capacity to pupil attendance? Weight, 1.

Architects' standards usually fix the pupil capacity of the high school building. Ohio and West Virginia specify certain standards in this respect. The data provide a check on the building program and on the school's policy. It also may provide a check on the growth of the school population.

This factor of efficiency is defective in that we have no state uniformity as to building capacity standards. Neither do we know from the data whether or not the high school is using effectively its building capacity. Then again, the nature and character of the curriculum will condition the effective use of the building.

13. What per cent of the pupils have the services of a trained librarian and sufficient library books to meet the state standards? Weight, 5.

The standard is 100 per cent. Most accrediting agencies for high schools specify certain requirements as to libraries. Practically all school authorities agree as to the need of modern library facilities. The weakness of this standard is apparent; a library may contain an undue proportion of fiction or of useless and out-of-date books. Then again, we have no definite standards of training for high school librarians. One school studied in this report stated that the librarian had twelve weeks of training in library work. The necessity of adequate library space for reading and study should also enter into consideration.

14. What per cent of teachers are now teaching subjects studied as major or minor subjects in college? Weight, 6.

The standard is 100 per cent. If college preparation is desirable, certainly special preparation for teaching obtained on the college level is worth while.

15. What per cent of the pupils are receiving, in regular classes, instruction in educational and vocational guidance? Weight, 7.

The standard is 100 per cent. These data give an indication as to whether or not the school is even attempting systematic work in this field. The weakness will be found in many different interpretations of educational and vocational guidance. Much of the latter is simply occupational study.

16. What per cent of the adult population is enrolled in evening schools or classes conducted by the high school? Weight, 2.

It is not necessary nor desirable, perhaps, that the entire adult population should be enrolled in evening classes; however, the accepted standard is 100 per cent in order that the schools may be placed on a comparative basis.

This factor makes no allowance for the character of the community. We need to know something about illiteracy in the community, about industrial conditions, the educational status of the community, social conditions, etc., before we can judge the need for evening classes.

17. What per cent of the pupils are given medical examinations with follow-up work and physical examinations with corrective physical training? Weight, 8.

The need of some standard in this respect is apparent. Most high schools have some form of medical inspection; few have any system of

follow-up work. In many schools the medical examinations are of a very incomplete nature. Practically no schools have corrective physical training; at least few in this study did. We need some agreement as to just what form medical inspection in high schools should take.

18. What per cent of the pupils are given some free time during the day in which they are strongly encouraged to engage in some activity that has recreational value? Weight, 4.

Since right use of one's leisure time is considered one of the chief objectives of education, this item has considerable validity.[1] We need, however, to know the nature of these activities which have recreational value. We need also to know the amount of time given to them and how they are directed.

19. What per cent of the pupils are receiving systematic instruction in worthy home membership (biology, home economics, nursing, the family, marriage, and parenthood)? This is based on enrollment in any one or all of these subjects. Weight, 9.

The National Education Association claims that "worthy home membership" is one of the aims of education. If it is a legitimate aim, we should try to find out how well schools are realizing it. We can readily see, however, that instruction in any one or two of these subjects would not necessarily make one a worthy home member. The instruction does indicate that the school is conscious of this need and that it is assuming some responsibility towards its realization. Certainly, if this is to be an aim of education, all schools should be doing some worth while work in this respect.

20. What per cent of last year's eighth grade graduating class entered high school? Weight, 5.

The accepted standard is 100 per cent. We have here an indication of the drawing power of the high school; an indication also of the way that transition between the eighth grade and the high school is cared for.

This item measures the faith of the community, to some extent at least, in the work of the high school. It does not show that the school may be so poor that a large number of pupils may have been eliminated before reaching the seventh and eighth grades.

In many high schools it should be remembered, also, that a considerable percentage of those who enter the first year of the high school are still within the limits of the compulsory attendance laws.

Results

Time does not permit a discussion of the results found in this study. It is interesting to note briefly a few of the significant items.

1. The median weighted index for the West Virginia high schools was 68.2 per cent. For the Ohio group, 59.1 per cent.

2. The average per cent of the total high school population attending school daily was 65 in Ohio and 54.3 in West Virginia.

[1] *Cardinal Principles of Education*, U.S. Bureau of Education *Bulletin*, 1918, pp. 1-20.

3. The average number of days attended ranged from 106 to 178, while the average number of days which the schools were kept open ranged from 170 to 184.

4. From 25 per cent to 33 per cent of the total school attendance in the 22 schools is found in the high school departments.

5. The data shows that boys do not attend high school in such large proportion as girls.

6. The holding power of the high schools was estimated by comparing the number of pupils graduated last year with the total number who entered high school four years ago. The range was 35 to 90 per cent.

7. A large majority of the teachers had more than one year of teaching experience.

8. Of the graduates of the West Virginia high schools, 43 per cent were continuing their education in institutions of higher learning, while only 15.7 per cent of the Ohio graduates were attending these institutions.

9. Of the 22 high schools, 15 had classes with fewer than 40 pupils enrolled.

10. A large number of the schools had teachers who were teaching subject-matter not studied as major or minor subjects by them while in college.

11. Many of the high schools were making no systematic attempt to provide regular instruction in vocational and educational guidance. One school reported 100 per cent in this item; with this exception the range was low—from 0 to 50 per cent.

12. The data shows that only 2 of the Ohio high schools were giving medical examinations with follow-up work, and physical examinations with corrective physical training. Of the West Virginia high school pupils 35 per cent were receiving this training.

13. Pupils who attended these high schools seemed to have an opportunity for training in the right use of leisure time.

14. Training for worthy home membership was neglected. Of the Ohio pupils, 32.4 per cent were receiving systematic instruction in this field, while 44.1 per cent were receiving it in the West Virginia high schools studied in this report.

15. Most pupils who completed the eighth grade entered high school. Of the eighth grade graduates in the eleven West Virginia schools 80 per cent entered high school; 88.6 per cent of the eighth grade graduates in the Ohio group entered high school.

16. The data indicates that very few of the high schools in this study were conducting evening classes.

No doubt you are able to point out many additional weaknesses in this index. No claim is made for its reliability or validity. If, however, it will provoke thought among school people, so that careful study may be made of the problem of measuring the work of the high school, it will have served a useful purpose.

Education for World Friendship and Understanding

HENRY LESTER SMITH, Dean of the School of Education, Indiana University

THE World Federation of Education Associations was conceived, during the period of our World War struggle, by men and women whose vision was not limited by the present, but who looked far into the future in connection with every project dealing with human welfare. Following informal discussions by such educational statesmen, the first world conference was held in San Francisco in 1923. The second conference was held in Edinburgh in 1925 when a more elaborate constitution was developed and the purposes of the association set forth.

From the beginning one of the main purposes of the association has been that of instilling in all mankind good will toward each other. It was recognized from the first, also, that this good will would have to be based upon a more adequate understanding than now exists. On the basis of this conviction, Superintendent Augustus O. Thomas, president of the World Federation of Education Associations, created a section of this association to discuss two questions: first, what teacher training institutions are doing to prepare teachers to teach world friendship and understanding; and, second, what materials and methods of instruction teachers in the classroom are using to attain this end with children.

As a basis for this discussion, a questionnaire was prepared and sent out to about one thousand representative heads of teacher training institutions and city superintendents of schools in an effort to gather information on the two points listed for discussion. The results from the returned questionnaires were mimeographed and copies of the findings and conclusions were in the hands of all who attended the sessions at the Toronto meeting of the World Federation of Education Associations in 1927. One outstanding conclusion reached on the basis of the information contained in the questionnaires and of the discussion that followed at the Toronto meeting was that there should be no conflict between patriotism for one's country, which it was thought should be instilled, and a world-wide point of view that would serve as a basis of international understanding and good will. It seemed to those who were present and interested in this subject that there could be allegiance to both of these ideals without weakening the allegiance to either one.

The group expressed itself further as feeling that additional information should be sought on the whole question. It was agreed that it would be advisable to conduct a study in each one of the nations of the world somewhat similar to that which had been begun in connection

with the schools of the United States. As chairman of the section dealing with this topic, I was asked to conduct such a study. Funds for the study were not available, so the Bureau of Coöperative Research, of the Indiana University School of Education, made a financial contribution toward this end. With these funds a study has been conducted in the United States and in Canada.

Three questionnaires were prepared: the first to be sent out to representatives in teacher training institutions; the second to teachers and administrators in the public schools; and the third to business and professional men outside of the field of education.

The first of these questionnaires (Form A) was developed to determine: (1) attitudes toward the general problem of developing, thru the schools of the nations, world feeling and understanding; (2) principles governing the administration in teacher training institutions of work planned with a view to giving teachers the knowledge and attitudes necessary to the carrying out of the above task; (3) principles governing the methods of instruction to be employed in teacher training institutions in this work; (4) special methods and devices to be employed by teacher training institutions in preparing teachers for this service.

The Form A questionnaires were sent to about 5,000 representatives of teacher training institutions in the United States and Canada. The names of those in this country were obtained through the Educational Directory of the Department of the Interior and included names of college and university presidents, summer session directors, heads of schools or departments of education, county superintendents of schools, superintendents of larger city schools, and state superintendents. The names of educators in Canada were obtained thru a representative in that country.

The first division of this questionnaire contained sixteen theses or principles pertaining to the preparation of teachers for the task of developing in school children world friendship and understanding. These principles were selected from literature on the subject and from the discussions at the Toronto meeting. The persons filling out the questionnaires were requested to state after each thesis whether it was acceptable or not acceptable, and, when not acceptable, to restate the thesis if in that way it could be made acceptable.

These theses were as follows:

1. The really important task before the world today is the creation of a new state of mind which will transcend national boundaries.
2. Double loyalty, that is loyalty at the same time to both the nation and to mankind as a whole, should not be a more difficult concept to grasp and hold than is the concept of loyalty to both city and nation or the concept of loyalty to both family and city.
3. It is, therefore, possible to develop, in the individual, world understanding and international-mindedness without loss of national interest and loyalty.
4. Such world understanding and international-mindedness on the part of individuals is an objective worthy the best efforts of any or all institutions of modern society.

5. This same world-mindedness is largely intellectual and must be based upon knowledge rather than upon sentimentality.

6. To be effective in the promotion of peace among nations this knowledge must be translated into new modes of conduct on the part of the individuals composing these nations.

7. It follows that treaties, agreements, and organizations for the promotion of peace can succeed only when formulated or established on a basis of thorough and sympathetic understanding among the peoples represented.

8. Internationalism, properly interpreted, implies an extended conception of citizenship rather than a super-government with its consequent minimizing of national importance.

9. It follows from the above that there is no real conflict between the idea of genuine national patriotism and that of internationalism.

10. Racial and national prejudices probably have their origin deep down in the early life of the individual, and can, therefore, be avoided or eradicated by a program of guidance which begins early and continues throughout the formative period of the individual.

11. An understanding of the religions of the peoples of the earth will in a large measure overcome the obstacle of religious denominationalism.

12. Education as provided by the schools and their many coöperating agencies may be a slow process by which to produce changes in civilization, but it is the only sure and permanent one.

13. It is possible for the schools of the nations, with the assistance of other service agencies, to produce a friendly world if they will to do so.

14. If children are to receive such instruction as will make them a part of a generation possessed of an international conscience and an international morality, they must be guided by teachers as ably trained in the command of these concepts as the best efforts of our teacher training institutions can produce.

15. If we accept the above theses we assign to teacher training institutions the task of developing courses and methods of instruction which will enable prospective teachers to meet properly the demands made of them in the training of children in international understanding.

16. On the basis of world understanding developed through the schools, we can create a machinery which in time of crisis will mobilize the world's opinion for peace.

Responses to the Form A questionnaires were received from 450 educators in the United States and Canada. The replies on this division were tabulated for each thesis separately. These were then combined, to make one tabulation cover all the theses. The total number of theses which were marked acceptable as stated was then divided by the total number of theses returned. Thus it was found that 77.1 per cent of all the theses returned were marked acceptable as stated. In the same way other tabulations were made, showing 2.9 per cent of the theses were not acceptable, 13.8 per cent were changed or restated, and 6.2 per cent were not marked at all. The fourth thesis was considered most acceptable as stated—93.7 per cent having been marked so—and the eleventh thesis was considered least acceptable—only 57.1 per cent having been marked so.

These same sixteen theses were used in the Form C questionnaire, which was sent to about 2,000 business and professional men outside of the field of education. The names of these men were obtained in part thru the office of the Chamber of Commerce in the various larger cities of the country, and in part thru *Who's Who in America*. The 200 who responded did not accept quite as many of these, as originally stated, as did those in the field of education. These tabulations were made in the same way as those in the first division of Form A. An average of only 72.4 per cent were accepted as stated; 2.7 per cent not accepted; 15 per cent changed or restated; and 9.9 per cent not marked. This group considered the seventh thesis as most acceptable—83.5 per cent having been marked so—and the sixteenth thesis as least acceptable—only 56 per cent having been marked so.

The second division of the Form A questionnaire contained the following five theses governing the administration of teacher training institutions:

1. Such training as prospective teachers will need for the work of promoting world friendship and understanding can best be given incidentally in courses in geography, history, government, international relationships, sociology, literature, music, art, etc., with each separate department devising its own materials and methods.
2. The training can best be given by separate departments as suggested above, but with some type of coördinating agency or bureau responsible for the planning and distribution of the various divisions of the task.
3. The training can best be given in a specially designed course under the control of the education department or general administration.
4. The training can best be provided by a combination of plans 1 and 3 in which a specially designed course is provided, but in which additional incidental instruction is given in connection with the work of other departments.
5. The work of training for world understanding can be safely left to teachers without any special training, if they are properly qualified in all other ways usually considered desirable.

These were to be ranked 1, 2, 3, 4, or 5, according to their relative effectiveness in developing an attitude of world friendship and understanding. The ranks given them were then weighted statistically. As a result, the fourth thesis was ranked as most effective, receiving a rank of 63.30, and the fifth thesis was ranked as least effective, receiving a rank of only 27.51.

The third division contained three groups of two alternate theses each, dealing with methods of instruction to be used in teacher training institutions in education for world friendship, and also five additional theses, similar in statement to the first sixteen, but relating to the methods of instruction to be used in teacher training institutions. The first two alternate theses were as follows:

1. The instruction should be direct, the objective to be reached in the instruction should be clearly and definitely stated, and the purpose of the work should be kept constantly before the students in training.

2. The materials and content should be presented to the student in training without specific statement of purpose and without definitely drawn conclusions, and the student be thus allowed to formulate his own concepts.

Thesis 1 was considered, by 57 per cent of those who answered, to be more acceptable as stated. Thesis 2 was marked more acceptable by only 26 per cent. The other 17 per cent who returned the questionnaires either changed the statement of the theses or did not mark a choice in this section.

The second group of alternate theses were as follows:

3. For this work new methods and new materials must be devised.

4. It is not new materials and methods we need but such a revision of materials and methods already available as will furnish the child with the truth regarding other peoples.

These educators found the second one much more acceptable than the first. Of those who responded, 68.7 per cent found thesis 4 more acceptable and only 14.7 per cent found thesis 3 more acceptable.

The third group of theses follows:

5. There is need for a specially prepared textbook treating the specific methods to be used in the public schools, around which the course for teachers is to be developed.

6. The work will be more effective if a textbook is avoided and current magazines and publications are employed instead.

They were considered as of almost equal value. Thesis 5 was marked as more acceptable by 33.8 per cent and thesis 6 by 34.9 per cent.

The five theses, relating to methods of instruction in teacher training institutions, were as follows:

7. Methods and devices presented to prospective teachers should be extremely practical and usable, without moralizing and preaching.

8. The instruction should suggest to the teacher the element of danger in presenting subject matter which has local political significance, while giving her, at the same time, the ability to handle the problems in such a way as to avoid a partisan viewpoint.

9. The teacher must be encouraged to develop a passion for and a knowledge of the truth in reference to peoples and nations, subordinating to this ideal racial, religious, and social prejudices and false national or local patriotism.

10. Self-activity and the concrete in instruction are to be desired both in the training of teachers and in the work which they are later to perform with the children.

11. If the truth about nations and peoples is to form the basis of instruction, textbooks and instructional materials must keep pace with industrial, political, social, and economic progress in all nations.

These theses were also tabulated in the same way as those in Division I. An average of 86.4 per cent of the theses were acceptable as stated; 2.1 per cent were not acceptable as stated; 4 per cent were changed or commented upon; and 7.5 per cent were not marked. The eleventh thesis was considered most acceptable—93.1 per cent having

been marked so—and the ninth was considered the least acceptable—81.7 per cent having been marked so.

In the fourth and last division were listed 24 subjects taught and 28 other special devices used in teacher training institutions to contribute toward a program which has as one of its purposes the preparation of teachers for participation in a program of education for world friendship. The list of subjects and devices used in this section was made up from suggestions of educators thruout the country. Those filling out the questionnaire were requested to rank these as 1, good; 2, fair; and 3, poor. The subjects, in the order of the rank given them, were as follows: international history, with a rank of 1.16; general international problems, current history, sociology, general history, geography, elementary international law, political science, literature, social psychology, economics, comparative education, educational sociology, modern languages, art, music, international languages, principles of education, play and games, secondary education, methods courses, philology, composition, and home economics, the last in order, having a rank of 2.71.

The special devices, other than the one listed above containing the list of subjects taught, were as follows:

2. A specially designed course based on some such book as *The Racial Basis of Civilization* by Hankins.
3. Cosmopolitan clubs.
4. Bureau of international correspondence in connection with the teaching of modern languages.
5. Exchange of lecturers between countries.
6. Travel by members of the teaching staff.
7. Attendance of students and faculty members of Institutes of Politics.
8. Interchange of students and teachers.
9. Travel by student teachers in foreign countries.
10. Additional scholarships similar to the Rhodes or Guggenheim plan.
11. International debating and local debating on international problems.
12. Pageants, drama, etc., interpreting the life and character of peoples of other countries.
13. Making the teacher thoroly familiar with instructional materials available for teaching international understanding.
14. A psychological or analytical study of play to show that the same games are and have been played all over the world for centuries.
15. A study of superstitions to show their fallacies and their similarities among many types and degrees of people.
16. Discussion groups where consideration of international questions is possible.
17. The reading of such books as Van Loon's *Story of Mankind*, or Breasted and Robinson's *The Human Adventure*.
18. A Foundation for the Advancement of the Social Sciences, which includes opportunities for conferences, and more particularly, for contact with leaders from various nations.
19. Translated copies of foreign newspapers which would enable stu-

dents to keep up with current events as interpreted by people of other countries.

20. A specially designed methods course dealing with the problem as it is to be handled in the public schools.
21. Short talks by the head of the school on current developments along the lines of international understanding.
22. An international museum.
23. Programs of music and poetry wherein the work of various nations is portrayed.
24. Delegates to educational association meetings in other countries.
25. Model Assembly of League of Nations.
26. Good Will Day programs.
27. An international library.
28. Traveling universities.
29. Observance of foreign holidays.

According to the judgment of these educators, the sixth device was of the greatest value with a rank of 1.30, and the twenty-ninth was of least value with a rank of 2.69.

The second questionnaire (Form B) was developed to determine: (1) principles governing the method of instruction to be used in the public elementary and secondary schools in developing in the children the knowledge and attitudes necessary to a feeling of world friendship and understanding; and (2) special methods and devices to be used in the public schools in instilling these attitudes in the children.

This questionnaire was sent to about 2,000 teachers and administrators in the public elementary and secondary schools of the United States and to about 100 inspectors of schools in Canada. The names of those in the United States were obtained in part thru lists of city and county superintendents of schools, and in part thru state directories of schools, where these could be obtained.

This questionnaire contained only two divisions. The first of these was made up of five groups of two alternate theses each, dealing with methods of instruction to be used in the public elementary and secondary schools in developing international good will and understanding. The five groups of theses are given below, together with the per cent of persons accepting each thesis, as stated, as more acceptable than its alternate and the per cent of persons accepting its alternate.

GROUP I

1. Provision should be made in the public elementary and secondary schools for a distinct program or curriculum dealing with world friendship and world understanding similar to the special provision now being made in many schools to care for character education.

2. The work of developing in children the proper attitudes of mind regarding other peoples can better be cared for if such special courses are omitted and the desirable material is presented as a part of the work in geography, history, English, foreign language, music, art, etc.

Thesis 1 .....17.2
Thesis 2 .....72.4

GROUP II

3. Whatever the particular organization provided, the instruction should be so planned as to insure a continuous and pointed emphasis as to its specific purpose, that of promoting international-mindedness among individuals and permanent peace among nations.

4. Rather should the child be given the truth concerning other peoples and other nations and be permitted to formulate his own attitudes of mind without the type of emphasis suggested in Thesis 3 above.

Thesis 3 ..... 41.4
Thesis 4 ..... 48.2

GROUP III

5. The material used should for the most part be concrete and distinctly objective.

6. Success will be better insured if the work is presented in the form of principles developed by the teachers and presented as such to the children.

Thesis 5 ..... 52.3
Thesis 6 ..... 35.6

GROUP IV

7. For this work of developing in school children world understanding and world friendship, we shall need new materials and devices.

8. New materials and devices are unnecessary if we will revise those now in use in such a way as to include in them only the truth about peoples of other nations.

Thesis 7 ..... 19.0
Thesis 8 ..... 67.8

GROUP V

9. For effective work a textbook should be provided which will bring together the information to be given to the child.

10. A textbook cannot be used as satisfactorily as magazines and other current materials since it is a prime necessity that the work keep pace with economic, political, and social progress.

Thesis 9 ..... 9.2
Thesis 10 ..... 70.9

The second division of this questionnaire listed 14 subjects taught and 31 special methods or devices suitable to be used in the public schools with the idea in mind of training children for international good will and understanding. These were to be ranked in the same manner as the subjects and special devices in Form A, altho the content dealt with the public schools rather than with teacher training institutions.

The following is the order in which the subjects were ranked according to their value in such a program: history, with a rank of 1.09, geography, literature, civics, music, foreign languages, art, physiology and hygiene, chemistry, physics, biology, physical education, domestic science, and arithmetic, last in order, with a rank of 2.78.

The special devices, other than the one listed above containing the list of subjects taught, were as follows:

2. Correspondence between the children of your school and children of similar grades in foreign countries.
3. Exchange of scrap books. These books are made by the children to illustrate their life and customs, and to give an idea of their cities, industries, etc.
4. Exchange of Christmas boxes (non-charity point of view).
5. Contributions of money and clothing to the needy of other countries (charity point of view).
6. Regular exchange with school children of other countries of such gifts as will throw light on the industries and customs of different peoples.
7. Visual education methods (selected films, slides, posters, pictures, magazines, etc.) employed to make children acquainted with the home life, surroundings, and desires of children of foreign countries.
8. A special study of ancestries with a view to suggesting the close relationships among peoples of different nations.
9. The intelligent use of current news with a view to indicating the trend of social and economic affairs throughout the world.
10. A continuous emphasis on the interdependence of peoples.
11. Pageants, programs, and dramatics, employed to interpret the lives and customs of other peoples.
12. A study of the music and songs of other peoples.
13. A study of the flags of all nations.
14. Games studied and played with a view to showing that play is fundamentally the same the world over.
15. A special study of the common fallacies and superstitions regarding other peoples.
16. Some effort at carrying the work of the school into the home with the idea of reducing the effect of prejudices acquired there.
17. A special effort in language and grammar teaching to show the inter-relations of the various tongues.
18. Study of the nature and work of organizations for promoting peace and fellowship.
19. Appropriate observation of Good Will Day.
20. A study of the holidays and holiday customs of other peoples.
21. Exchange visits of children of different countries.
22. Accurate translations of such newspapers and other publications as will give the pupil a true picture of progress among other peoples.
23. A special study of the peace-time heroes and heroines of other countries.
24. A study of the leading figures in the contemporary political world.
25. Sparing and selective use of returned missionaries and travelers.
26. A special study of the contributions of other peoples to the literature of the world.
27. A special study of the contributions of other peoples to the art of the world.
28. Exchange of teachers between countries.
29. Addresses by representatives of foreign peoples.

30. An international commencement program in which the contributions of other countries to the development of the United States is emphasized.
31. High school students' international club.
32. A school World Friendship League.

The seventh of these was considered most valuable, with a rank of 1.18, and the twentieth least valuable, with a rank of 2.27.

The third questionnaire (Form C), devised for the purpose of learning the reaction of thinking men and women of the country, outside of the field of education, toward the training of children for world friendship and understanding, has been discussed in connection with the first division of Form A, as it contained only the one division.

On the whole, the returns from these three questionnaires have shown that there is a great interest among far-seeing people of the world today in creating a friendly feeling among the nations of the world, and a desire on their part to sanction and further the work of the schools toward this end. Approximately 75 per cent of those responding accepted the general theses presented therein, and a majority of those who did not accept them suggested changes which would make them acceptable. Ranking and comment received on the questionnaires on the subjects and devices listed as effective in a program of training for international good will will be of value in reorganizing instruction in both teacher training schools and in the public schools so as to make it more effective in developing such an attitude on the part of the citizens of the country. With such an interest on the part of those answering the questionnaires, there is no doubt but that important steps can be taken toward the development of more effective programs of education for world friendship and understanding than have heretofore been possible.

Such progress has been made with this study in the United States and in Canada that we shall have for discussion at the Geneva meeting of the World Federation of Education Associations a printed summary of the opinions and practices representative of teacher training institutions and public school systems in these two countries. It is the plan also to present at that meeting a printed pamphlet setting up a tentative program of procedure in training teachers to develop in children international understanding and good will.

A Study of Certain Problems Dealing with Scholastic Achievement in a Teachers' College

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TEACHERS' colleges all over the United States are critically studying problems of organization, curricular revision, relationship to other institutions of the state, their students, and many problems of various other types, dealing with the local service of the school.

In this paper two problems are to be considered. First: On the basis of certain selected factors, how do the various groups of students at the Indiana State Teachers College compare? Second: What is the relationship between the previous records of the students who elect the elementary teacher-training curricula and their records in the first year at the college?

The factors to be considered in the study of the first problem are the ages of the students at the time of entrance, the size of the high school from which these students come as measured by its enrollment, their average high school scholarship, their performance on the psychological test given at the time of their entrance to the school, the average number of credit points per term hour of credit earned in the fall term, in their first year in the Indiana State Teachers College.

A detailed description of the method of collecting these data and of the techniques used in the analysis of them is not included in this paper. However, a few statements are included here to show the nature of the measures used. Anyone interested in a more detailed discussion of these points is referred to the complete study[1] on file at the library of Indiana University. The age of the student is the age given on the registration blanks of the Indiana State Teachers College. The high school enrollment is the enrollment as given in the State Directory for 1926-27. The average high school scholarship is the average of all high school work computed after all the high school marks have been converted to the percentage basis with 75 per cent as the passing mark. The psychological scores are the standard scores of the students who took the Detroit Intelligence Test in the fall of 1927.

$$\text{Standard score} = \frac{X - M}{SD}$$

[1] Jones, J. W. *Scholastic Prognosis and Entrance Requirements in a State Teachers' College.* Doctor's thesis, School of Education, Indiana University, 1929.

(Where X is any score, M is the mean of the scores, and SD is the standard deviation.)

The average credit points per term hour of credit in the fall term and the first year were calculated by assigning credit points to each of the letters of the five point marking system in use at the Indiana State Teachers College.

The subjects of this study were the students of the freshman class of the Indiana State Teachers College, 1927-28, classified into three groups: the elementary group, including all students who indicated on their registration cards that they were enrolling in the curricula required of prospective elementary teachers; the college group, including all students who indicated on their registration cards that they were enrolling in the curricula required of prospective regular high school teachers; and the special group, including all students who enrolled in the several curricula required of prospective teachers in special subjects. Data[2] collected annually by the administration tend to show that students at the Indiana State Teachers College come annually from the same social and economic levels, the same counties, i.e., the same high schools, the same distances from Terre Haute, and in approximately the same ratio each year from these groups. In Abell's report of the mental testing done at the Indiana State Teachers College since 1922, data are given to support the statement: "Each group tested showed a very wide range of scores and a tendency to approach very closely the normal frequency curve. It was noticeable for three fall terms that the distributions showed the same characteristics regardless of the test used or the term when given. It is evident that large groups of beginning students have certain group characteristics that change little from term to term."[3]

On the basis of these results and the homogeneity of the source of entering students, the assumption was made that the freshman class of 1927-28 was a typical entering class. The past records and performance in the first year of the Indiana State Teachers College were assumed to be typical of similar groups.

The comparisons between the three groups of students are here presented in a condensed form for the sake of brevity. The summary data for all factors are brought together in one table (Table I). Column 1 of this table designates the group: E, elementary teacher-training group; C, regular high school teacher-training group, and S, special subject teacher-training group. Column 2 gives the means for the various factors for each group. Column 3 indicates the groups whose means are being compared. The letter in column 4 indicates the group in whose favor any difference is apparent. Column 5 gives the significant ratio of the differences. The formula for this ratio is given at the top of the table. Column 6 indicates the chances in 100 that the true difference is significant and not due to sampling.

[2] Bogardus, F. S. *A Continuous Survey of the Indiana State Normal School.* Unpublished master's thesis, School of Education, Indiana University, Bloomington, Indiana, 1928.

[3] Abell, E. L. "Mental Testing: Its Forms and Results at Indiana State." *The Normal Advance* XXXV:5:1.

TABLE I—SIGNIFICANCE OF THE DIFFERENCES OF MEANS OF THREE STUDENT GROUPS, INDIANA STATE TEACHERS COLLEGE.

$$\text{Significant Ratio} = \frac{M_1 - M_2}{(PE_{M_1})^2 + (PE_{M_2})^2}$$

Group	Means	Compare	Difference in favor of	Significant Ratio	Chances in 100 true difference is significant
1	2	3	4	5	6
			Age		
	Years				
E....	18.45	E–C	E	.91	73
C.....	18.35	C–S	S	3.67	99
S.....	18.79	E–S	S	2.96	97
			High School Enrollment		
	Pupils				
E.....	358	E–C	C	5.66	100
C.....	606	C–S	S	1.80	89
S.....	683	E–S	S	10.97	100
			Average High School Scholarship		
	Per Cent				
E....	88.60	E–C	E	.78	70
C....	88.39	C–S	C	6.89	100
S.....	86.33	E–S	E	8.42	100
	Standard Score		Psychological Test		
E....	.1063	E–C	C	1.56	85
C....	.2006	C–S	C	6.38	100
S.....	—.2188	E–S	E	5.44	100
	Average Credit Points Per Term Hour		Average Scholarship—Fall Term		
E....	2.03	E–C	C	3.48	99
C....	2.20	C–S	C	2.03	91
S.....	2.10	E–S	S	1.53	85
	Average Credit Points Per Term Hour		Average Scholarship—First Year		
E....	2.10	E–C	C	4.21	100
C....	2.30	C–S	C	1.39	83
S.....	2.23	E–S	S	2.91	97

See text, page 34, for explanation of this table.

The data in this table seem to support the following statements:

Those students who are enrolled in the four-year regular high school curricula are probably the youngest of the three groups studied. Those students who elect the specialized curricula are the oldest of the three groups, and in both cases the differences are not due to sampling.

Those students who enroll in the elementary teacher-training curricula seem to come from the smaller high schools as measured by the enrollment of these high schools. The special subject group seem to

come from the larger high schools. These two conditions might be due to the fact that the graduates of the larger high schools have had a broader secondary curricular contact than the graduates of the smaller high schools, with the result that they are more interested in specialized fields than those who have not had these contacts.

The difference between the performance of the students of the elementary group and the college group on the psychological test does not indicate a reliable difference.

The superiority of both the elementary and college groups over the special group in performance on the psychological test is seemingly a real difference not due to sampling.

The scholastic achievement of the college group as measured by the average credit points per term hour of credit is seemingly a little better than either of the other two groups, with the special group higher than the elementary group.

In considering the second problem mentioned above, the technique of correlation has been used. From the zero-order correlations higher order correlations were calculated in order to derive the regression equation using three prognostic factors and the criterion.

The correlations between scholastic achievement in the Indiana State Teachers College and the factors used are given in Table II. Table III gives the correlations between the Indiana Composite Achievement Test and the several factors and between the average high school scholarship and the several factors.

The data given in these two tables seem to support the following statements:

There is practically no relationship between the age of students at entrance and their success in the first term of the Indiana State Teachers College, and there is a relationship of —.1097 ± .0435 with scholastic achievement in the first year.

There is evidenced a lack of relationship between the size of the high school enrollment and the factors correlated.

TABLE II.—CORRELATIONS BETWEEN SCHOLASTIC ACHIEVEMENT IN THE TEACHERS COLLEGE AND A GROUP OF FACTORS KNOWN ABOUT THE STUDENTS WHO ELECT THE ELEMENTARY TEACHER TRAINING CURRICULA AT THE TIME OF ENTRANCE TO THE INDIANA STATE TEACHERS COLLEGE.

FACTORS	Average Credit Points Per Term Hour	
	Fall Term $r \pm PE_r$	First Year $r \pm PE_r$
Age at entrance	.0633 ± .0380	—.1097 ± .0435
High school enrollment	.0024 ± .0409	—.0003 ± .0477
Average high school scholarship	.5604 ± .0257	.6079 ± .0276
Psychological test	.5454 ± .0267	.5653 ± .0299
Indiana Composite Achievement Test	.6334 ± .0360	.6870 ± .0298
Average credit points in the fall	.....	.8580 ± .0120
	N approximately 325 cases	

TABLE III.—CORRELATIONS USING THE INDIANA COMPOSITE ACHIEVEMENT TEST, AVERAGE HIGH SCHOOL SCHOLARSHIP, AND A GROUP OF FACTORS FOR THE ELEMENTARY TEACHER-TRAINING GROUP OF STUDENTS.

Correlation with ..... and Factors Below	I. C. A. T.... $r \pm PE_r$	Average H. S. Scholarship $r \pm PE_r$
Age at entrance	—.3178 ± .0469	—.0804 ± .0376
High school enrollment	—.0754 ± .0567	—.3027 ± .0371
Average high school scholarship	.6569 ± .0286	.....
Psychological test	.7455 ± .0227	.4780 ± .0295
Average credit points in Teachers' College Education courses	.5475 ± .0352	.5385 ± .0267
Average credit points in fall term	.6334 ± .0306	.5604 ± .0257
Average credit points in first year	.6870 ± .0298	.6079 ± .0276
	N 176	N approx. 320

The average high school scholarship has a higher correlation with the scholastic achievement in the first year than it does with the scholastic achievement in the fall term.

The psychological test correlates from .02 to .04 lower with scholastic achievement than the average high school scholarship.

The correlation between the scholastic achievement in the fall term and scholastic achievement in the first year ($.8580 \pm .0120$) seems to indicate that the scholastic achievement of a student is fairly well demonstrated by the quality of the work he does in the first term.

The Indiana Composite Achievement Test correlates higher with scholastic achievement in the Indiana State Teachers College than any of the other factors studied.

Data are presented in the complete study[4] to show that the relationships between the various factors as shown by the correlations are greater with the elementary group than with the other two groups studied. This is especially true for the correlations of the several factors with scholastic achievement in the fall and in the first year. There are eight factors for which correlations of this type have been obtained for all three groups separately: high school enrollment, high school English, high school constants, high school average, age, psychological test, English in the Teachers College, and education in the Teachers College. In six of the correlations of the factors with the scholastic achievement in the fall, the elementary group has the highest correlation—high school enrollment, high school constants, high school average, psychological test, English in the Teachers College, and education in the Teachers College. The college group has the highest relationship when high school English and fall achievement are correlated. The college group has the highest negative correlation when age is one of the factors. The situation is the same when the scholastic achievement in the year is one of the variables. The elementary group has the highest correlation in six

[4] Jones, J. W. *Scholastic Prognosis and Entrance Requirements in a State Teachers' College.* Doctor's thesis, School of Education, Indiana University, 1929.

cases, the college group in one (with psychological test), and the college group has the largest negative correlation with age.

The correlations obtained in this study seem to indicate a higher relationship between previous achievement in the high school and success in the Teachers College for the elementary group than is evidenced in the other two groups.

These facts seem to indicate that the elementary group is doing more nearly what they are capable of doing than either of the other two groups. There may be a reason for this in the fact that these students are expecting to go out to teach at the end of one or two years' training. They are concerned with getting thru school at once and not in three or four years, as are the students of the other two groups. Consequently these students seem to exert a greater effort to achieve success in the teachers' colleges. It seems that the necessity of making good in the first two years is an incentive to do work more nearly equal to previous performance for the elementary group than it is for either of the other two groups. Thompson and Russell[5] arrived at a similar conclusion in a recent study at the Ball State Teachers' College, in which they used the following as measures of scholastic success: number failing a course, number making less than one honor point per hour of credit, and number warned for poor scholarship.

As indicated above, this paper avoids the derivation of the statistical factors used, and for this reason no discussion of the equations given in Table IV is included here. Suffice it to point out that the first equation may be used to give a student a rough idea of the quality of work he can be expected to do in the light of his average scholarship in high school. Its chief value probably lies in the fact that it may be used to emphasize the importance of high school scholarship as a guide to successful work in the teachers' college.

TABLE IV.—TWO REGRESSION EQUATIONS FOR USE WITH ELEMENTARY TEACHER TRAINING GROUP

$$Y = .0998\ H - 6.6937 \pm .4000$$
$$r_{YH} = .6079$$

$$Y = .0456\ H + .3156\ I + .0967\ P - 1.9211 \pm .3422$$
$$r_{Y.HIP} = .7227$$

Code: Y = Average credit points in first year
H = Average high school scholarship
I = Indiana Composite Achievement Test
P = Psychological test

The second equation makes possible a more accurate prediction of the average number of credit points to be expected of a student when his average high school scholarship, his standard score on the Indiana Composite Achievement Test, and his standard score on the psychological test are known. It is assumed that anyone using such equations

[5] Thompson, C. O., and Russell, Dale. "Some Factors Affecting the Scholastic Success of Teachers College Freshmen." *Bulletin Indiana State Normal School, Eastern Division* II, No. 4, Ball Teachers' College, Muncie, 1927.

as these is thoroly familiar with their limitations and appreciates their use as aids and sign posts.

Just a word should be said here regarding the coefficient of multiple correlation given in Table IV ($R_{Y.HIP} = .7227$). Perfect correlation is indicated by $+1.00$ and the difference between 1.00 and .7227 seems to indicate that there are other factors which should be discovered and studied in order that we may approach perfect prediction. In the judgment of the writer some of these factors will be found in each of two fields: (1) further improvement in the techniques of measurement, particularly by the use of an achievement test, and (2) a careful development of a technique of measuring those latent personality traits necessary for successful teaching, and which it is the duty of the teachers' college to develop fully.

One privilege left to the state is that of saying what kind of teachers it wants in its schools. Every effort of the state to raise the standards for licenses may be construed as a step toward the selection of students to be trained by the state.

As studies reveal rather definite information concerning the qualities of physical fitness, mental capacity, personality traits, scholastic achievement, and actual activities necessary to be carried on by the classroom teachers, it is not inconceivable that our ability to guide into the teachers' colleges those young men and women who possess the necessary qualifications for success will be materially improved.

As further investigation adds new information on the problem of teacher training within the state, and as the cost of educating those who are not good teaching prospects becomes more evident to the people who pay the bill, it may be that rather definite limitations will be set up as to who shall be trained to teach the children of the state of Indiana. The problem may become one of quality production which will look squarely at the source of supply and require for the teaching profession those students of demonstrated scholastic ability, possessing those latent personality traits requisite for successful teachers. It will continue to be the duty of the teachers' college to develop these traits during the training period.

We have heard recently some discussion as to whether or not a college education pays. The financial returns of teaching no doubt have some bearing on the selection of teaching as a profession by the young man or woman who has just completed four years of high school training. It is doubtful whether anyone will question the desire of school administrators to make the return to the teacher worthy of her efforts.

Propaganda dealing with the oversupply of teachers has a tendency to divert from the profession persons who might otherwise become valuable teachers.

It has seemed to me during my study of the problem of scholastic achievement that there is a rather close relationship between the two problems: (1) supply and demand, and (2) scholastic achievement plus physical and mental fitness.

In the conference yesterday, and again this morning, several factors were pointed out which should be considered in teacher-training.

Scholastic achievement is recognized as one of these factors. Others are of importance. The general reorganization movement evident in teacher-training institutions everywhere is one result of a critical study of the job of the teacher.

Each of these conditions indicates an increasing attention to the quality element in teacher-training.

In conclusion, when we are discussing the problems of supply and demand in our profession, let us direct very careful attention to the quality demanded by employers of teachers as well as to the quality of the supply. If we can increase materially the quality of the demand, I feel that the teachers now in service can be relied upon to help with the quality of the supply.

New-Type Testing and Some Critical Evaluations

WENDELL W. WRIGHT, Professor of Education, Indiana University

NEW-TYPE and home standardized tests have recently come into very common and widespread use. Hundreds of thousands of them in various subjects have been used in Indiana this year. In this short paper I wish to deal with five factors that relate to the new-type or home standardized test:

1. How may their content be determined in the developing of new-type tests?
2. Some simple methods of validation.
3. The accuracy of the measurement of the test.
4. The use of the new-type test as a measure of the curriculum.
5. Some cautions concerning the use of new-type tests.

One of the best ways of determining the content for a new-type test over a certain semester's work is that of having the teacher write down from day to day after each recitation the most important points developed in that recitation or the skills or appreciations attained. If these are written down from day to day by the teacher, perhaps on a 3 x 5 card, and placed in a box, near the end of the term there will have accumulated a résumé of the important parts of the semester's work in the classroom. If tests are to measure as nearly as possible the achievement of the teaching, this method of determining the content of a new-type test is valid. If several teachers teaching the same semester's work, let us say in American history in the seventh grade, do this same thing, and if the common factors of the material so collected by several teachers are put into the form of a new-type test, it can well serve the city or county as a measure of the achievement of the pupils of that given grade and subject.

A second method of determining content for new-type tests is that one that has been most often used. It is the analysis of the text or texts and other teaching material that form the base of the semester's work. A good way to analyze the texts and other teaching material is to have several teachers go thru the materials used and to indicate those skills, knowledges, relationships, etc., that they consider important in this text and teaching material. If these are then brought together by several teachers, those points which are important according to the opinion of one-half or more of the teachers may be used to form the content of the new-type test for a given semester or year.

As courses of study develop until most of them are of the type of the better ones of today, it will be possible to use them as the most important base for the content of new-type tests. For example, in most better courses of study there will be found a column of "expected out-

comes" or "attainments" for each grade or half-grade. If these outcomes or attainments can be definitely stated, there must be some available evidence of that attainment on the part of the pupil. This attainment cannot always be measured by the new-type test, but an increasingly larger number of these attainments are fairly well measured by properly constructed new-type tests. Therefore, by going to the column of expected outcomes and attainments for each half-grade or grade in any subject, it is possible to determine the content of the new-type examination based upon that semester's or year's work.

Another source that may well serve as a basis for the content of the new-type test for any given year or semester is that of the previous examinations in that subject. For example, if, in an analysis in eighth-grade history for some ten previous examinations made out by different teachers, it is found that the meaning and significance of the Monroe Doctrine is tested, then it may be assumed that this represents in the minds of a group of teachers who have made out these tests a significant factor in the teaching of American history for that grade. In a sense this represents a minimum essential which should not be omitted in the testing of this subject.

Another source of content of new-type tests used locally or in counties or in the state, which has often been omitted, is found in that phase of our work that we may call local adaptation of the course of study. Perhaps I can give an example. While in this state we use a state-adopted spelling book which includes those words of most common usage in written language and which is graded according to difficulty and use and, in so far as I know, is satisfactory, nevertheless there are words not found in that speller that each child in the state of Indiana should know how to spell. These words are local in character. They apply to our own state situation. While for a spelling book which is to be used thruout the country such words as Indianapolis, Wabash, Hoosier, etc., would not be included, nevertheless these words for this state are of such common usage and are so tied up with our own state history that children should know how to spell them. Any local community, Bloomington, for example, would have words somewhat common to its community, words connected with the stone industry about which children will write, words connected with the University, and words connected with proper names, applicable only to this city. Such words which, of course, should be taught in our schools and such words which in general should supplement any general course of study would form a part of the content of a spelling test for this city.

It might be interesting to you to know in passing that, of the 15,000 pupils upon whom we have data, who took the Indiana Composite Achievement Test last year, 48 per cent of them failed to spell the word "Hoosier" correctly. Now, perhaps Hoosier is a word which we do not need to know how to spell. However, it is one which is commonly used and commonly written. It is, of course, local in character and I am afraid because it was not included in the textbook itself (and it should not have been), we have failed to teach it. I believe if we would include in our new-type test this local content, we would tend to

develop on the part of teachers the teaching of these local variations from the textbook and the course of study.

I have tried to indicate here five sources of the content of new-type tests: (1) the teacher's day-to-day work; (2) an analysis of the textbook and other teaching material; (3) the expected outcome stated in the course of study; (4) the analysis of previous examinations; and (5) those factors of local social value which should, of course, be taken care of thru the adaptation of the course of study to the local situation and in the teacher's work from day to day. Wherever it is possible, it is highly desirable to use all five of these sources rather than any one singly. For example, in the Indiana Composite Achievement Test we analyzed previously-given seventh and eighth grade examination questions for a period of nine examinations to find those factors which seemed to be held important in previous examinations. We analyzed the expected outcomes in so far as they are stated in the Indiana state courses of study in the various subjects. State-adopted textbooks or most commonly used textbooks were analyzed by a committee to determine those items which should be included from that point of view. We obtained, from a large number of teachers of the seventh and eighth grades, suggestions as a supplement to the other types of analysis. We made some slight additions such as I have suggested a moment ago in relation to spelling, local government, Indiana history, etc. It is our experience that, had we left out any one of these factors, we would have had a less valuable and less usable content in the various forms of the test.

After such a method of developing the content of new-type examinations there are still other simple methods of validating that content. I will suggest one which can be easily used. After the items of the test have been selected and have been turned into new-type questions, such as multiple choice, single response, matching, true-false, best answer, etc., it is highly desirable to have teachers who have not been connected with the development of this test, but who know the field of the subject-matter, criticize it. Let me illustrate. In Forms A, B, C, and D, of the Indiana Composite Achievement Test, there are 2,486 separate items. While we had already had critical evaluations of these items and had gone thru the various steps in development of the test which called for some pooled judgment, nevertheless it was found, when we sent out these items to approximately sixty good seventh and eighth grade teachers in the state and asked them to mark the items 1, 2, or 3 (1 meaning excellent, 2 meaning good or fair, and 3 meaning poor and should not be included), that the critical evaluations of the items by these sixty selected teachers threw out approximately fifty of these items. This method also selected several hundred items which were ranked as excellent by 98 per cent or more of the teachers. In making Forms X and Y of the Indiana Composite Achievement Test, which is made up of those items that have stood all the checks that may be placed on items which would go into a standardized test, it was possible to use only items which had been indicated by this group of teachers as being excellent. This simple method of validation, merely having the evalua-

tion and criticism of groups of teachers other than those who make up the test, is a highly desirable, valuable, and simple method of validating a test. While the test will not necessarily be valid if only this simple method is used, it will certainly be improved by the use of this method.

Another important factor that relates to the use of new-type tests is the accuracy of their measurement. Let us assume for the minute that content of the test has been properly arrived at, that the simple method of validation just described has been used. There is still another important factor to be considered and that is, Does this test measure what it purports to measure accurately and consistently? That is to say, if you were to give this test today or if you were to give it tomorrow, would you get the same result? We usually speak of this as the reliability of the test. We have paid little attention to the reliability of new-type tests. However, we have always given as one reason for the use of new-type tests, as over against the essay-type test, that they are a much more accurate measure. The reliability of the essay-type test has been variously determined. However, it seems fair to say that the reliability of an essay-type test does not often exceed .60 and is usually lower. How reliable are new-type tests? I can only answer this question partially and with my own experience. During the last year I have studied the reliability of several new-type tests developed and used locally in various parts of the state. The reliability of these tests vary. The reliability of various new-type tests used in the sixth grade, first semester, are here given. The reliability of some standard tests used in the sixth grade are also given.

6th Grade New-Type Tests		*6th Grade Standard Tests*	
Physiology	.76	Gregory History Tests	.79
History	.87	Kirby Grammar Test	.87
Reading	.90	Thorndike-McCall Reading Test	.60
Arithmetic	.86	Buckingham-Stevenson Geography Place Test	.86
Spelling	.93		
English	.74		
Geography	.52		

The reliability of the Indiana Composite Achievement Test, Form C, and the Stanford Achievement Test for the eighth grade are as follows:

Indiana Composite Achievement Test, Form C	.978
Stanford Achievement Test, Form A	.96

While a composite test is usually more reliable than a single subject test, it is fair to assume that, unless the reliability of the single test approaches .90, such a test used alone is not a particularly accurate measurement for a particular field. That is to say, while it may measure the group as a whole fairly well, its error of measurement of the individual child is so great that, should he be failed or passed on the results of this test, malpractice in promotion may be said to have taken place. Therefore, to those of you who are developing new-type tests, it is highly desirable, if you are to use these new-type tests as a measure for promotion purposes, that you determine roughly the reliability of the test. If you do not care to carry out the statistical procedure, and

that is not particularly difficult, then at least do this much. Give the test to a group of pupils on one day and give it to the same group of pupils without having discussed it with them a day or two later. Rank the pupils from highest to lowest by means of your first application of your test and then rank the pupils from highest to lowest by means of the second giving of the test. If you find decided changes in the rankings of these pupils by the use of the two sets of test scores, you may feel fairly well assured that the test is not highly reliable. If you find that the rankings are practically the same when the test is given a second time, then you may feel assured that the test is highly reliable and will therefore rank the pupils at one time about the same as it would rank them at another—that is, that it consistently measures in the same way.

The use of new-type tests as a means of study and measure of the curriculum has not been as widely used as it would seem to justify. I wish to take three examples of what I mean. The first one is taken from a well developed new-type examination made for a given grade in a given city in Indiana, where the content was based upon the local course of study and local practice of teachers as well as the state-adopted textbook. The course of study sets forth as one of its expected attainments in this grade that the child should be able to multiply a three-digit number by a three-digit number. When these children were tested at the end of that particular half-grade it was found that 67 per cent of them could not multiply correctly 369 by 274 and other problems of like nature. When an analysis was made of the types of mistakes that were made in this problem, it was found that such difficulties as addition, carrying, and muliplication all entered in to mark this inability. This is an excellent school system, with excellent teachers and supervisor. It is, in my judgment, distinctly above the average school system of the state. The mere fact that faces us is that, altho it is set out as an expected attainment that children at the end of this grade should be able to multiply three-digit numbers by three-digit numbers correctly, under better than average conditions 67 per cent of them had not obtained this objective. Such measures which may be made thruout our public school system are likely to show us some facts about grade placement and time allotment that we have not heretofore paid attention to.

In most of the schools in the state of Indiana, geography and physiology are discontinued at the end of the seventh grade. Therefore, a test given to pupils at the end of the eighth grade is given one year after the completion of their work. The same examination given to them at the end of the seventh grade is at the completion of their work in these subjects. Therefore, it would seem that whatever increase in achievement was found by the end of the eighth grade over that at the end of the seventh must be due to two factors: (1) selectivity, that is, better pupils having attained the end of the eighth grade, or (2) incidental teaching in these subjects which is carried on thru the teaching of other subjects. Therefore, if the scores in geography tests covering the work in geography do not show any marked increase

in the eighth grade as over the seventh, we may fairly assume that, when the teaching of geography as a special subject stops, achievement in that subject also stops. On the other hand, if we were to find marked increase in achievement in geography at the end of the eighth grade over that of the seventh grade, by pupils who have not taken geography as a subject, we might fairly assume that this increased achievement was due to learning in geography even tho the special subject of geography was not taught.

The same type of analysis might as well be applied to physiology as to geography. The facts of the case in Indiana are that those pupils who stopped their formal instruction in physiology at the end of the seventh grade and who also stopped the formal instruction in geography at the end of the seventh grade show a marked increase in achievement in physiology and health as measured by the tests by the end of the eighth grade, while the same pupils show very slight increase in achievement in geography (this perhaps is due alone to selectivity) by the end of the eighth grade. This represents the results of thousands of pupils thruout three years of study. The per cent passing each item at the grade levels of the sixth, seventh, and eighth grades is known. What is the meaning of this in our own state curriculum? It seems apparent that this indicates that, when geography as a formal subject is discontinued at the end of the seventh grade, learning in geography is also discontinued; but that, when physiology and health as a subject is discontinued at the end of the seventh grade, learning in this subject continues thruout the grade that follows. An analysis of the content of the course of study and the state-adopted or most used texts in Indiana shows that, in general, in science taught in grade 8 approximately one-third of the teaching is along the line of health, and in civics of the eighth grade approximately 25 per cent of the subject is given to community health or problems that are closely related to it. In addition to this, the work in physical education offered for seventh and eighth grade pupils no doubt carries with it some increased knowledge in physiology and health. Therefore, we may safely say that in the state of Indiana education in physiology, hygiene, and health, or the learning of pupils in this subject, continues on thru the eighth grade even tho the subject is dropped as a subject at the end of the seventh; while geography, on the other hand, is not continued in the teaching of other subjects, not even in the teaching of American history, to any marked degree, and when formal instruction stops in geography at the end of the seventh grade, pupil learning in geography also stops. Perhaps these findings are not so significant except to point out to us the fact that we must consider the inter-relations and inter-correlations between subjects in the making of courses of study and in teaching and testing. One of the outstanding tasks now facing the state curriculum committee is the task of finding the inter-relations that exist between subjects, or what someone has called the "core of the curriculum." Testing of the new type may well serve to help discover these inter-relations.

One more example can be taken from the results of the testing of achievement in Indiana thru the use of the Indiana Composite Achieve-

ment Test. The way in which the spelling test has always been developed as one of the nine subjects of the Indiana Composite Achievement Test is as follows: we take the total number of words in the seventh and eighth grade lists of the *McCall Speller*. We select by random samplings—that is, taking every thirteenth word of this list, or every twenty-second word of this list,—until we have obtained fifty words. We have made this selection six different times by different random sampling methods. We have supplemented, of course, this list of fifty words by including one word, local in character, in it. We now have available the results of the testing of thousands of children on these fifty words. These show a very skewed distribution. You ordinarily expect from the measurement of achievement a somewhat nearly normal distribution. Thruout five such tests we have obtained this type of a skewed distribution. A large per cent of these children spelled the fifty words, which are truly representative of all of the words in the seventh and eighth grade lists, correctly. This is perhaps one of the most accurate measurements that we can have of the relative efficiency of our teaching of this subject toward the attainment of the objectives set forth in the spelling course of study to teaching children to spell those words commonly used in written language. The per cent of efficiency attained in spelling is practically 75.

The same data may also be shown for the arithmetic test, where the problems are selected over the seventh and eighth grade work in arithmetic. This particular distribution is practically normal. The relative efficiency that we are attaining in this subject is approximately 60. The superiority of achievement in spelling over that in arithmetic is of interest to those who wish to consider these facts in relation to the building of a course of study. Perhaps, again, the teaching of spelling outside the spelling period contributes a great deal to success in this subject. The teaching of arithmetic outside the arithmetic period is perhaps not so common and perhaps this again suggests a study of the inter-correlation of activities between subjects so that we may better know the amount of time that should be given to the various subjects, or what might better be called the overlapping of learning activities in the various subjects.

I cannot pass over this short discussion of new-type testing without pointing to three cautions which should be kept in mind. In the first place, users of new-type tests should remember that the new-type test itself is only a means to an end and not the end itself. I have worked during the last two years with many groups of teachers in the development of new-type tests. Somehow or other I have not found myself so much interested in the test when it was completed as I was interested in the test when it was being made. That is, the real value of developing a new-type test will come from a closer study of classroom practice, a closer study of the course of study, and a development in the minds of the teachers of those essential factors in any given year or unit of work for which a pupil should be held responsible in an examination. When one begins to try to put down the essentials of any half-year of work, essentials which are drawn from the teachers' and pupils'

own experiences or from the course of study or from the textbook, that teacher is naturally brought more nearly face to face with her own work and thereby compelled to make a closer study of it than she is if such new-type tests are not developed. Therefore the value of developing a new-type test is perhaps not only in the new-type test that results but it is also in the value that comes from having a teacher study her own teaching situation. Then, after the test is given, the teacher can again face her own situation. If she assumes that tasks are completed at the end of a given period of time and the results of a test show that not more than 50 per cent of her class have really achieved that task, she is face to face with two problems, either some better learning and teaching conditions for the child or a change in the time allotment or grade placement of that subject-matter. These are the results from new-type testing that are valuable, and not the printed and mimeographed tests which she uses, or the comparison with norms.

The second point to be remembered about the use of new-type tests is this—there is still a place for the essay-type examination. There is no very good way yet to measure thru the new-type examination the ability of a pupil to organize and express his thoughts. These are essentials in the life achievements of any pupil. The essay-type examination gives a better measure of that than any type of written measure which we now have. Essay-type examinations may well be used to supplement measurement thru new-type testing.

The third caution is that the use and subsequent results of a test must always be remembered to be the means to an end, and thereby to supplement the teacher's work and the teacher's common sense. A few days ago I had a long distance telephone call from the northern part of the state from a teacher who said, "I have a boy here that took the Indiana Composite Achievement Test, Form X, and made a score of 360. Should I fail him or pass him?" I appreciate that the question was asked from a sincere point of view. However, do you realize how impossible a question that was to me or anyone else who did not know the whole situation, did not know the pupil that he had in mind, and did not know his own philosophy of promotion? I could only tell him what had been general practice in this line, and wanted to be mean enough to add, "This is an instrument to help you to use your common sense and not to substitute for it." I could give him the information, of course, that, if this particular boy was industrious and had been a consistent worker thruout his seventh and eighth grade work, the likelihood was that he would succeed in his high school work if he made a certain score or above on the Indiana Composite Achievement Test. I could tell him also that, below a certain score on the Indiana Composite Achievement Test, the likelihood was that this boy would fail to pass in high school subjects. However, I could not, nor could anyone else removed from that boy, tell him whether that boy should be failed or be promoted when he did not know the boy nor the situation under which he was working. This is merely to illustrate that the results of any new-type or standardized test are for the purpose of helping us better to use our common sense.

Education and the New World

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IT will be the purpose of this discussion to set forth with some emphasis certain factors in modern life that profoundly affect our philosophy and practice of education. The argument is based upon the belief that, in the first quarter of the present century, American society has entered upon conditions of living that are new in the whole history of civilization, and that education has thereby been given novel opportunities and responsibilities.

How sharply these new conditions impinge upon traditional modes of thought and action is suggested by the recency of their occurrence. If we liken the five thousand years of recorded history to a single day, then the last hundred years is equal to the last thirty minutes of time—a vivid reminder of how lately the world's knowledge of science and of other matters which we owe to the methods of science has been achieved. Fifty years means fifteen minutes, and all that has passed of the present century would be but the final seven and one-half minutes of our historic day. The evidence that these latest minutes have transformed the basic conditions of human living is compelling.

In certain respects the growth of new conditions has taken place outside the system of education itself. Indirectly, but also with great rapidity and with irresistible strength, changes in economic and industrial life have swept up and about our schools creating educational problems which we did not foresee and to which we have only begun to make a conscious adjustment. Economic changes have been paralleled, partly as effect and partly as cause, by changes in the political and social structure and ideals of America and the world, and America has acquired a greatly increased leisure in which to think about the improvement of its modes of living.

We have seen in this period a great expansion of the program of education and have been thrilled to participate in the achievement of many long cherished ideals, but the processes of readjustment are only well begun. There lie ahead of us unsolved problems that are exceedingly difficult and of profound moment for the future of our own children, our nation, and the world. Never before did the schoolmaster hold in his hand the happiness and the usefulness of so many human beings; never did the structure and perpetuity of civilization rest so completely upon his frail wisdom and devotion. His simplest obligation is, therefore, to understand this new world; his final responsibility is to shape the program of education for the maximum of service to it and to its children.

The claim that the world is new has been repeatedly made thruout the history of mankind. Apparently children have always made it to their parents, and each generation looks upon its predecessor as old-fashioned. One may well ask, therefore, whether the present view embraces elements of magnitude beyond the gradual changes which have ever occurred from century to century. It is beyond our power to glimpse the picture which this age may hold in the minds of men a century or two hence, but to the thoughtful observers of our own generation, the altered and altering conditions of life seem profound, accelerated beyond any previous period of the world's history, and to require a new assessment of educational aims and practices.

Basic Elements of the New World

What then, may we ask, are the basic elements of this new world? First of all, we may place the growth in knowledge that has occurred in recent times. May I suggest the scope of this fact by relating an incident that occurred during my graduate days at Harvard University. President Eliot was invited to speak to the Graduate Club and he came bearing under his arm a bundle of very old and battered books. Laying them upon the table he proceeded to tell a story which I recall as follows: In the early days af Harvard College, a young student displayed such brilliance in scholarship that upon graduation he was retained as a tutor. With commendable spirit he set about further study, tho in that day graduate work in our modern sense was, of course, unknown. His self-conceived program embraced both an ideal and direct action. As an object to be attained he resolved to become "the master of all knowledge." As a first step he proceeded to collect for himself all the books that he would need for this purpose. It was this collection of books that President Eliot bore under one arm to the meeting of our club. This ambitious youth died early and no record remains to tell the tale of his ideal. After relating this story, President Eliot recalled to our minds the university libraries in which we were then studying. He further described the new library which Harvard hoped then to develop. Pointing the contrast between the armful of books upon the table and the great libraries of books in modern universities, he said in substance: "This is what has happened to the world of knowledge during the short lifetime of an American university."

The past hundred years have been unique in all the history of mankind in their contribution to knowledge and in increased possibilities of comfortable, happy living. The dynamics back of this achievement have been discoveries in the field of the natural sciences. So rapid and so profound have been the changes wrought in twentieth-century civilization thru the subtle influences of scientific discovery, we are all but lost in our attempts at intellectual and practical adjustment. Two mighty allies of science have been the wider passion for scholarship extending in myriad directions to enlarge the realm of human knowledge, and the American genius for mechanical and electrical invention shooting forward in Herculean strides the industrial and commercial life of our people. Nothing but the extremest terms suffice to picture the range and

depth of the influences arising from the resistless energy with which the forces liberated by these movements have penetrated to the minutest recesses of our ideational life and altered the details of our living. It is but a faint picture of what has happened to say that it is like the creviced frost that cleaves the compact granite of the hillside into crumbling sand. In part, this figure is descriptive because the fabric of our ideational life has in recent years been repeatedly unsettled. But, also, we have experienced something akin to the terrific onslaught of the constructive engineer upon nature's geography in his building of canals and skyscrapers and airships, since our world of thinking has not merely suffered disintegration. It has also been wrought into new forms to create a genuinely new intellectual world in which we move about even tho we may fall short of comprehending it.

The New Physics

Does this picturesqueness seem extravagant and to arise from no reality behind it? Let us then call competent witnesses. The oldest of all the natural sciences is physics, cultivated in its elements by very ancient civilizations, and an integral part of all bodies of human knowledge from Archimedes to this present hour.

The modernity of the new intellectual world is suggested by the names of men whose work has made the science of physics as it now exists. Are not these the ones: Galileo, Newton, Garnot, Faraday, Clerk Maxwell, Hertz, Lodge, Thomson, Roentgen, Curie, Gibbs, Rowland, Michaelson, Einstein, Milliken, and the scores of practical physicists who have turned theories into useful tools? Two of those named lived before the nineteenth century. All but four have lived in the last quarter of that century, and most of them belong to the first quarter of the twentieth century.

The progress of science is the story of theories arising out of experience, submitted to careful observation and experimentation, and restated in more comprehensive and more accurate form. "It is a remarkable fact," writes Professor Swann, "that practically all of those achievements in the physics of the past twenty years which might be classed as utilitarian, have arisen directly from, or in relation to, investigations pursued with no utilitarian motive directly in view. X-rays revealed themselves first in the light of their importance in surgery. The study of their properties shed a new light upon the structure of the atom and this light was reflected back with enhanced intensity to clarify the properties of the X-rays themselves."

The oft-told tale of Clerk Maxwell's contribution to modern physics is another case in point. Maxwell was a mathematician. Purely as a theoretical matter he demonstrated that certain unknown waves of electrical energy must exist if the previous discoveries of physicists were to be harmonized into a completely rational scheme of thought. Upon his theoretical demonstration a series of later physicists, particularly Hertz and Lodge, worked to demonstrate in tangible ways the existence of such electro-magnetic waves, and Marconi, building upon the work of

these, gave to the world the amazing invention of wireless telegraphy and telephony.

The perceptual picture of scientific advance is revealed to us in tangible changes in the conditions of our living. A glance at such changes reveals at once the marvelous impact of physical science upon civilization, and the promptness with which society has responded to modern discovery. It was but little more than thirty years ago that Roentgen discovered X-rays, yet what consequences have flowed from that capture of one of nature's secrets, and of others which followed in rapid succession. On the practical side we have, on the one hand, the improvement of surgery, the treatment of cancer and the like, and on the other the modern radio tube, a variety of appliances used in radio transmission, greatly improved X-ray tubes, and the brilliant electric bulbs used in artificial lighting.

This list of practical devices based upon scientific discovery that have become essential instruments of daily living could be multiplied at great length. In a recent address Professor John Zeleny dwells at some length upon "the commonplace practical values of science." In his list, which is not intended to be exhaustive, he names the following: the magnetic compass, which has driven superstition from the high seas and charted safe highways upon its turbulent bosom; spectacles, which have corrected the defects of the human eye and opened the minds of men to accurate observation of the world about them, and particularly to books; the miscroscope, which extends human vision into the minute recesses of matter; and the telescope, which brings vast distances and new worlds within its range; the steam engine, a giant worker of almost unlimited power; the dynamo, a powerful rival and companion of the steam engine; the electric light, which has banished night from civilized lands; the telephone; the telegraph; the wireless; the internal combustion engine which, within forty years, has created 600,000,000 of horse power for the service of American citizens; and the X-rays, which have brought hidden things to light and marked astonishing advances in the treatment of dreaded human diseases.

Modern Medical Science

When we thus look upon the ancient science of physics, reclothed and revitalized by the last ten minutes of our historic day, what shall we say of medicine? It was in 1860, when thruout the world the dread of human putrefaction stalked every wound or surgical operation, that the French Academy of Science honored Louis Pasteur for his demonstration that fermentations are of bacterial origin; it was in the seventies that Robert Koch proved that a particular disease may be due to a particular microbe and that a particularly small microscopic bacillus wreaks the deadly havoc of tuberculosis among mankind; later still came the doctrine of immunity and the practice of vaccinations; it was in 1891 that Metchnikoff finally proved that the phagocytes in our blood are our real defense against certain bacterial diseases. Later in the nineties the cause of malaria was discovered to lie in the bite of the mosquito, and the first year of the twentieth century saw the terror of

yellow fever wiped forever from the earth in the dramatic experiments of Walter Reed.

Before our own eyes the miracle comes to pass—not one lonely searcher without equipment inventing his own way forward into the mysteries of life and death, but a regimented army of trained scientists, with fully equipped laboratories in universities and research institutes, in medical schools and hospitals, driving relentlessly forward with a thousand devices against the diseases that infest the human frame, pushing back, back, by months and years, the dreaded day of death, within a quarter of a century adding to the average life about ten years, and to our hundred twenty million people nearly a billion years of time.

The Miracle of New Power

The temptation is great to follow into other fields of knowledge this tendency to expansion. The point is clear from the illustrations already given, and we should turn to another body of facts which are in large part a consequence of our growing knowledge. Increasingly man is gaining control over his material environment and is becoming emancipated from grinding toil. An illuminating exposition of this matter has recently been given by Dr. Walter Dill Scott in his address as president of the American Council on Education.[1] In vivid comparisons President Scott set forth the accumulating power available for the use of the human family in the United States. As a criterion of comparison he used the engineer's unit of horse power and its equivalent of twenty-five slaves. With this "common unit of measurement" he traced the growth of power from about 4000 B. C. to the present time. "At the peak of prosperity in Babylon, Egypt, Greece, and Rome the average freeman possessed power possibly the equivalent of two slaves available for his use." The meagerness of this surplus power will be apparent in the facts of later growth. In the census of 1869 the records reveal that from this equivalent of two-slave power in the pre-Christian era the accumulation had amounted to about twelve-slave power for "every man, woman, and child in the United States." There was "a total of 20,000,000 horse power distributed among the 40,000,000 of the population."

More significant still is the fact that the period represented by the 1869 census witnessed the beginning of a movement that is still in the stage of acceleration. As an outgrowth of expanding scientific knowledge and clever invention, the power available for work in the world has increased to an extent which we can hardly grasp when it is stated in figures, and the import of which we can scarcely comprehend.

The detailed data described by President Scott reveal the astonishing fact that the power available to every person living in America today is the equivalent of 175 slaves, or almost a thousand slaves for every family of five.

[1] "The Rapid Development of Mechanical Power and Its Influence on Education in America"—Chairman's Address, May 5, 1928, at meeting of the American Council on Education. *The Educational Record* IX, No. 3, July, 1928, pp. 132-149.

Certain additional facts even more significant than the gross figures of total power are adduced by President Scott in the following statement:

"The accumulation of power is a phenomenon peculiarly American as it is much greater here than in any other nation. The amount of power accumulated by the people of England is, per inhabitant, only one-third as great as it is in America. In Germany it is less than in England. In France it is less than in Germany. In all other nations it is still less. In western Asia, in central Africa, and in certain other lands, there is practically no accumulation of power.

"Not only has America accumulated 175-slave power per inhabitant, which is three times that of any other people, but the rate of accumulating this power is increasing faster in America than in any other land. The American who today possesses the equivalent of 175-slave power will probably posess double that amount in a few years. He is also constantly improving the methods, the conditions, and the implements for availing himself of this power.

"According to our census report of 1869, over 50 per cent of our power was animal and less than 50 per cent of it mechanical, but at the present time it is approximately 2½ per cent animal and 97½ per cent mechanical power."

Science in Industry—Oil Cracking

A single illustration coming within the daily experience of all of us will illustrate the twin contingency of science and industry upon problems of modern living. Prior to the World War the American oil industry was taking large quantities of crude oil from the ground and, thru refining processes, removing from it a certain amount of gasoline for use in gas engines. The demand for gasoline power had already become so great, particularly for automobiles, that the country was faced by two dangers: that the development of industry would be slowed up by a shortage of gasoline, and that producers in order to meet the accelerating demand for it would speed up crude oil production, remove from the oil the precious power fluid, and allow the remaining products, for which the demand was much less, to be wasted. Science in the immediate service of industry came to the rescue. Certain slightly developed processes of gasoline production were subjected to intricate and expensive experimental study. From these experiments came the commercially profitable oil cracking processes, which a recent writer has described as "the glory of the oil industry, its supreme achievement." In the dozen years from 1916 to 1927, thru the cracking process there was recovered from crude oil a total of more than two and one-half billion barrels of gasoline that by old methods would have been wasted. Thru increased methods of refining and reduction of evaporation losses an additional two billion was saved and more than a billion barrels were added thru the recovery of natural gasoline from natural gas. These several methods of conservation have, in this twelve-year period, yielded a saving equivalent to 48.5 barrels, or about 2,400 gallons for a family

of five persons, enough to carry them upon a journey equal to seven times the circumference of the earth.

"The importance of this conservation is difficult to comprehend from the figures alone. But when it is realized that, during the last twelve years, the conservation effected in the United States has been greater than its entire crude production up to 1921; that it was over 62 per cent of the entire world's production up to that year; that such conservation alone was 54 per cent more than the total crude oil production of the United States in 1922-26 inclusive and 8 per cent more than the world's production for that period; and that nearly one-half of this conservation has been effected within the past three years, the importance of the progress of the oil industry during the past few years becomes apparent."[2]

Another criterion to indicate the importance of this achievement is to note that, while the average price of all farm products in 1927 was 55 per cent more than in 1913, the retail price of gasoline had risen but 12.2 per cent. Couple with such figures the fact that America owns 550,000,000 horse power in automobiles, and it becomes apparent that, if American society is really headed toward the economic and moral destruction so luridly pictured by campaign orators, not only is it journeying thither in automobiles at an ever-accelerating rate of speed, but it is thus traveling at excursion rates so low that even the much depressed American farmer can take the whole family along.

We cannot here follow the implications of these facts concerning the increase of power into all the issues resulting from them. Nothing, not even the cataclysm of the World War, has so shaken our civilization to its very heart as has the expanding and enriched economic life of our people resulting from this miracle of new power in the world. It has created widely distributed wealth; it has shortened the hours of necessary labor and enormously increased the return from it; it has created leisure on a fabulous scale; it has reduced poverty, facilitated travel, elevated standards of living, and set us a thousand educational problems of which our parents had not the faintest dream.

More than 67 per cent of our present power resides in gas engines, and another 10 per cent is to be found in electrical plants and machines. The significance of these facts becomes more apparent when you realize that we have an automobile for every five persons in our total population; that the entire nation, every man, woman, and child, could arise any morning and at an identical hour with all their pet dogs, cats, and parrots start to pay a social call upon our neighbors to the north or those to the south; that with phenomenal rapidity we are laying across the continent the necessary roads to facilitate such travel; that these roads are daily thronged with loaded cars going, not ten, but fifty miles an hour, and bound for a destination, not ten or fifty, but a hundred or a thousand miles away. Think what this means in our crowded city streets mostly built for pedestrians and horse-drawn vehicles; go out upon any paved highway and observe the crowding stream of motor cars; stand alongside any transcontinental highway on any day from

[2] Westcott, J. H. *Oil—Its Conservation and Waste.* Beacon Publishing Company. New York, 1928, p. 47.

April to October and note the license plates that reveal the motorists' local habitation; in summer visit any one of the great national parks and mingle with the multitude of neighborly folks from every corner of the land and from every level and station in life, and you will begin dimly to sense the tremendous revolution that has quietly wrought the destruction of the economic and social world that surrounded our own infancy and youth, and which has created the new world in which our children live and from which they must draw their intellectual and spiritual nourishment.

New Economic Freedoms

For one thing, the new order created by the expanding reach of modern science and the accumulating power of modern invention and industry has increased our wealth and given us in America enough to eat. The primitive bitter struggle for essential food is all but gone from our land, and the specter of haggard poverty is disappearing from among our people, may we hope forever. An abundance of crass, material things have suddenly become available—foods garnered from the ends of the earth, clothes in a variety and comfort-giving quality hitherto unknown, houses in number and size and beauty undreamed of by our fathers, machines and factories for the further increase of wealth, savings accounts and investments. If want and hunger still prevail in any quarter, it cannot be due to a dearth of food materials, but rather to the faulty processes of distribution, or perhaps in some cases to sloth and depravity.

At the same time, the coercive burden of drudging toil has been lifted from the sweating shoulders of all our people to a degree almost unbelievable. Hours in industry have gradually shortened to twelve, to ten, to eight, until almost everywhere men and women may claim as their very own the remaining sixteen hours from every twenty-four. Couple this with the lengthening years which men may live, and the total leisure that appears for our people is fabulous indeed. Never before in the history of the world could the social philosopher say with equal truth, as Mr. Hoover said during the recent campaign, we are on "the road to the abolition of poverty."

To be sure, there are prophets of an evil day when people will have become so numerous that the earth cannot produce the food they will need to eat. Certainly that day has not yet arrived, and the United States Department of Agriculture prophesies that, when in the year 2000 we shall have become a nation of 200,000,000 people, there will then be ample food to nourish a population larger than that. As not before in all history, the gross comforts of civilization can be secured to all our people without "building upon the bowed and sweating backs of embittered men and women."

Intellectual Changes

Quite as arresting as the new economic freedoms thus described are the intellectual freedoms which have accompanied and followed our

industrial expansion. Hamlin Garland has called attention to the fact that, when the American pioneer, slashing his obscured way thru the great tangled forests, came out upon the open limitless prairies of Illinois and the lands that lay beyond, his whole psychology experienced a radical change. The open sky was overhead, the unhampered land swept away to far horizons, and the old frustrations of swamp and thicket and malaria were mercifully removed, and a new outlook possessed his soul.

The American mind, altering with the changing industrial scene of our own day, is quite as real a fact. In the first place, it must think in larger units. The man whose income in 1900 was a thousand dollars now receives two thousand. Not long ago a millionaire was so unusual as to attract nation-wide attention and to incite suspicion and even fear; now even the multi-millionaire is a familiar citizen, and reputed great wealth no longer deters a man from the highest elective offices in the land. On every hand, for people and things and distance and wealth, hundreds have grown into thousands, thousands into millions, and these into billions.

Space and time are no longer what they were in our own childhood. Within the memory of men now living the human voice could be heard only across the room or the street; now it speaks across continents and oceans, and a public man speaks directly to millions of his fellow-citizens in a single hour. A little while ago we traveled upon solid ground at ten miles an hour or less in animal-drawn carriages, or, on occasion, upon trains at a speed of twenty-five to forty miles. Now travel is vastly more flexible, more rapid, more subject to individual desires, and the long-envied birds of the air are being shamed both in speed and height of flight.

In the presence of all this quickening of action, this reduction of time, this enlargement of space, this enrichment of experience, and the multiplication of personal contacts, the human mind assumes new attitudes, sloughs off old habits, refines its intellectual process, and sets itself in tune with the changing world. Good fortune attends the older man who has not been trapped by the experiences of his own youth and who can readjust himself to the life into which his own children are born.

Meaning of New Conditions for Education

What new conceptions of education, we may now ask, flow from these recently achieved conditions of human living in America? Within the necessary limits of this discussion only a few of the new problems which the schoolmaster is called upon to meet may be considered. First of all in the list may be placed the new demands upon the school curriculum. If the school is properly to represent to children and youth the civilization in which they, in their turn, must play their own parts, then the world's new knowledge must somehow be assimilated into the course of study of the elementary and the secondary schools. In view of the rapidly altering condition of knowledge, it is clear that the process of assimilation must be continuous, and that the school curriculum

must assume a degree of flexibility not necessary in the days when knowledge was limited and circumscribed. The range of materials now available for instructional purposes makes necessary a process of selection that is increasingly difficult to effect.

To speak of the curriculum as presenting a new problem is not to ignore the important work done in recent years by educational leaders. It must be readily admitted, however, that we have hardly yet developed dependable techniques of curriculum making in any field, nor have the promising experiments conducted in certain centers permeated widely thru the schools. The major tasks still lie ahead.

For one thing, we must find some means for making concrete, in the experiences of children, the results of the changing world of science. It is not alone that the scientific facts themselves constitute proper material for instruction. Equally important are the economic, social, and political consequences to which the ever-lengthening chain of discoveries and invention leads. The available sources of new materials are many and varied, and relative values are frequently obscure, but the more complex the world becomes, the more insistent is the need for giving it an adequate representation in school curricula.

May we consider secondly a problem arising from the increased wealth and leisure of our people. Because of this new condition, it is now possible to postpone the day in a child's life when he must begin to earn his own living. This favoring fact has made possible the lengthening of school life. A recent report of the Bureau of Education shows that the average schooling of an American citizen in 1840 was 208 days. This had been increased by 1870 to 582 days, and by 1920 to 1,200 days. Within the four years from 1920 to 1924 the increase was an average of 46 days. During the current year there are approximately 32,000,000 children and adults in schools and colleges, and the swelling tide of educational interest is still rising. More than 900,000 adults are engaged in teaching and in other forms of school service. Approximately two in every seven of the total population are engaged in teaching and studying, and the American people are spending annually about $3,000,000,000, mostly raised by public taxation, upon education. Such a picture could not have been painted in pre-war days, nor at any previous time in American history. Every rise in economic freedom has released the spiritual forces of our people, and they have turned to the schools and colleges as the instrument of guidance into a new civilization, and are creating a great social machine as a guarantee of continued opportunity.

Once we become vividly aware of the profound alterations in current living, it requires no great acumen to see that the schools have new problems in the matter of educational support. The rapid and substantial increases in educational budgets in recent years have been ground for encouragement, but those near the responsible tasks of educational administration are keenly aware that far larger budgets will be needed if the schools are to meet effectively the tasks that lie ahead. How educational leaders can carry this view convincingly to the public is a matter requiring the greatest skill. It is thrilling to read that our

annual educational budget is $3,000,000,000, but when we learn that the annual expenditure of our people for recreation and amusement is more than $21,000,000,000, it is clear that great resources still lie untouched which may be used for the improvement of the educational program. It would seem that we have as yet made but a beginning in presenting the case for education to our friends and neighbors.

Education for Leisure

But increased wealth with consequent leisure has not merely made possible a greater quantity of education; it has profound effects upon the direction of education. More than before the matter of education for leisure has itself assumed a new magnitude as a counterpart of the rising economic level, and the schools have only as yet begun to face the problems which are thus presented.

The release of human energy from the enforced earning of the daily bread has expanded the play life of the American people, and particularly American youth, to undreamed-of dimensions. Think of the proportion of our new automobile power which is used in joy-riding. "The glory of motion" with which De Quincey thrilled in riding down from London with the Mail, would seem an anemic diversion, indeed, to a modern youth accustomed to seventy-horse power motors on the ribbon-like highways now building on every hand. Count the golf courses, with their clubhouses, multiplying not merely in the large cities, but near every town of moderate size; witness the ever-enlarging crowds at college football games, at some of which more than 100,000 spectators pay more than $250,000 for a scant two hours of pleasure; visit the motion picture theaters in any American city, large or small, and observe the throngs crowding by the ticket window, leaving from ten cents to $2.50 in exchange for an admission ticket to two and one-half hours of entertainment; watch the transcontinental highways in summer and see the tourists who leave home and business for months at a time to indulge themselves with the magic of new landscapes, new skies, new peoples, new interests, the glory of swift travel, thrilling in their emancipation from the tyranny of locality. So general has this travel phenomenon become that an American can no longer safely behave as if he were away from home, since his neighbor may appear at the next corner.

Within such an atmosphere of human interest the schools can no longer treat play as an incident in school procedure, nor merely as a therapeutic agent to prepare for more serious business in the classroom. Play has itself become a matter of major educational importance. One of the happy fruits of this situation is the ascending interest in good music, which everywhere is claiming more attention from the schools. Many forces are now converging to lift music, and particularly musical appreciation, to a major place among the recreational interests of adults. Yearly, musical interests and opportunities expand, and more and more, we may have genuine music in the theater, in the concert hall, in the home, and upon the air. Even as I write these words in my study in Minneapolis I hear the overture to *Rienzi* played for America's high

school and college students with the matchless artistry of Walter Damrosch and his orchestra in New York City. In these conditions it is both the privilege and the obligation of the schools to educate youth to an increased participation in an enriched musical life.

In the graphic and plastic arts we have somewhat less to warm our hearts. To be sure, many schools have long given courses in art, but in this matter we are still many years behind the development in music education. Art itself has been gripped by hard traditions, forcing here and there unenlightened revolts, and the art teachers in the schools have been confused by conflicting issues in the craft itself. Most serious of all has been the tardy recognition by our hard industrial age of the place of beauty in human living. Good fortune, however, seems to impend. Even the automobile manufacturer has discovered that joyriding does not consist entirely in accelerated motion, but also in being part of a colorful scene framed in pleasing lines. Industrialists are learning that it is commercially unprofitable to make ugly machines for sale, and millions of men and children have found in a new leisure the opportunity for new imaginations, and for sincere expressions in form and color of personal moods and sentiments. Such facts set a new program before our schools. The time should come when bad taste in clothes, ugly houses, ugly roads, and ugly factories and stores will be a reproach to our educational program.

New Need for Coöperation

Numerous are the other educational problems set by the new day, problems of adult education, problems of occupational education, problems of teacher-training. I shall take time for only one more.

These rapidly occurring changes have produced in the world a new need for coöperative living with implications for an enlarged program of social, as distinct from intellectual, education. One does not need to subscribe to all of Mr. Hoover's political theories to realize that the President of the United States is the apostle of a new day in the matter of community enterprises. His achievements during the war, first in Europe, then in America, and again in Europe, when he organized the willing powers of millions of men, women, and children to achieve what armies and navies could not do and what organized governments could hardly attempt, are well known. His accomplishments in building up both the spirit of coöperation among men in industry and business and the social machinery for making it effective have been less open to the public view, but his eight years of service in the less spectacular matters are of equal significance. His record is a demonstration that men may work together rather than in destructive rivalry, and that all the values of life will thereby be enhanced. It may be well believed that this individual record is but a wholesome expression of profound needs and forces of the new world in which the lot of the now living generation is cast. Adequate techniques for coöperative endeavor are signposts pointing the road to social health, national welfare, and wholesome international relations.

How basic is this need for coöperation in modern life was revealed in a recent conversation with a personnel officer of a large corporation. He was reporting on the matter of recruiting the scientific staff for the laboratories of his industry, laboratories with an annual budget of $19,000,000. In such a field we have been wont to exalt individual ability and have preached loudly the gospel of freedom. This officer pointed out that productive research in his laboratories is based on the effective coöperation of scientific men of diverse training and interests. To be fruitful in investigation it is necessary for physicists to work effectively with each other, and even more with physiologists, chemists, psychologists, physicians, and teachers. Men might be clever scientists, but, unless they can pool their diverse gifts in a unified program, that program fails. The capacity for coöperative effort is quite as essential as high specialization. He further said that men to whom coöperation was difficult or impossible were allowed to depart from his organization, an organization that commands the most gifted and most excellently trained scientists. As specialization extends, the necessity for coöperation increases.

This incident may be regarded as illustrative. American business and industrial life for a half-century have tended in a like direction and the very genius of American political life has risen from the voluntary pooling of individual purposes and desires.

As the need for coöperative living increases with the changing years, the limitations of a purely intellectual education become more apparent, and the demand upon the schools for an effective program of social education becomes insistent.

In reference to this matter it sometimes appears that youth is wiser than its elders. They run ahead of the school's advance, and, in some cases, counter to its program in devising the means of their own social education. They create extra-curricular activities not merely as a form of self-expression, but, also, as an instrument of self-education, and all too often school officers look upon such activities as something extraneous to an educational program. Probably we know less about the means of social education than we do about many other school affairs, but the matter cannot thus rest. If educational processes are to contribute to the forms of living demanded by modern life, then social education must acquire a new meaning in the schools, the curriculum must be set to such a purpose, and teachers must acquire a new type of training.

If this discussion has not failed its purposes, a backward glance over the route we have traveled in it should leave one impression above all others. Education for the new and rapidly altering civilization into which our children are being led must be enlarged in quantity, diversified in direction, and enriched in quality. To have a part in making that education and that civilization what they should become is the schoolmaster's privilege and obligation, a challenge to all his powers.

Aptitude Tests for Teachers

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AFTER more than ten years of existence, the aptitude test is still in its infancy. From the beginning it has manifested a healthy I.Q. and robust physique, but the time for intensive tutoring of its progress toward a more advanced stage has arrived. We need a better understanding of the functions of aptitude tests, more analysis of specific aptitudes and their inter-relations, and further studies of correlations with intelligence, success, and scholarship.

Pioneering thru the work on aptitude tests offers its special difficulties. There are the usual misunderstandings concerning what such tests are supposed to measure. Perhaps recourse to the dictionary will clarify the test maker's use of the word "aptitude" and will dispel the notion of some people that aptitude tests and proficiency tests are alike in their objectives.

The dictionary defines "aptitude" as "the capacity for anything, suitableness, readiness to learn." Synonyms given are "ability" and "endowment." "Proficiency" is defined as "knowledge, skill, expertness in any branch of learning, science, art, or industry." This definition seems to imply a measurement of the amount of intelligence, the results of the use a person is making of endowment plus learning or of his capacity. We find such measures of proficiency in the trade and achievement tests in the vocational and educational fields.

Dr. Hull[1] in his excellent book on *Aptitude Testing* defines an aptitude test as "a test designed to discover what potentiality a given person has for learning some particular vocation or acquiring some particular skill." He explains a proficiency test as "a test designed to discover how perfect or skilful a person actually is in a given type of activity, quite regardless of the amount of training previously received." In other words, the aptitude test should show what special talents or lines of effort one should select for training toward proficiency.

Obviously the best aptitude test is the one which can determine whether an individual without special training is adapted to the field which the test purposes to measure. This test is the best because it is the most economical of time and effort for the individual being tested. For instance, the Seashore[2] tests for musical aptitude have detected many cases of children who have been given years of musical training which were wasted effort and money because there was not present in the learners these special aptitudes which make the ingredients for proficiency in music.

[1] Hull, Clark L. *Aptitude Testing.* World Book Company, 1928. P. 50.

[2] Seashore, Carl. *Tests of Musical Aptitude.* Iowa State University, Iowa City, Iowa.

But we cannot count on the aptitude test alone to forecast success. This is not the claim of the test makers. Neither is this within the limits of possibility as we now see it. Even tho so experienced an author of tests as Dr. Seashore, whose test in musical aptitude is undoubtedly a proved success in what it purposes to do, even tho such a person may analyze the specific aptitudes for success in a particular field, he will not be able to include in the test many of the factors which go to make up success in the use of the talent possessed. Perseverance, character, resourcefulness, power to anticipate difficulties, and a hundred more personality traits are interwoven with aptitude in any line. Thus far the one or two best known tests for measuring character, temperament, will, and the like have not been proved wholly successful. Until such tests have been perfected, we shall have to use observation and subjective data to support the results of the aptitude tests.

It is well to remember that aptitude differences are of two classes: (1) differences among individuals in the amount of the same traits possessed, as seen in the genius in comparison with the subnormal mind; and (2) differences in the amount of traits and talents within a single individual, as found in child prodigy chess-players who may be ordinary in their other abilities. As an instance of this second class, Dr. Hull cites Napoleon who was so poor a speller and Latin student as to be a failure in his classes. Probably each of us is in the X group in our possession of some aptitude. At the same time, we may show every evidence of being a Z student in regard to some other aptitudes. Not often is one a zero in all aptitudes. A popular example of aptitudes is that of the person who is an X spender of the family income, but a Z proposition when it comes to increasing the savings account. And there is always the ancient joke concerning the young bride who decks the dinner table with X proficiency and then weighs it down with the Z-est of biscuits.

There are recognized two types of professional aptitude tests, the specific and the general. Under the specific may be listed the Orleans-Solomon Latin Prognosis Test for ability to learn Latin—a test which is designed to detect a particular aptitude.

General or battery aptitude tests include the following:

1. Seashore's Test of Musical Aptitude measures, by judgment of phonographic records of paired tones or groups of tones, five musical aptitudes: pitch discrimination, consonance, time, intensity, and tonal memory. The result is "a kind of average potentiality for music achievement." Dr. Hull suggests that the test might be organized to forecast independently the special aptitudes of singing, playing the violin, playing the piano, and the like. The test would thus be of service in determining special fields for which one may have a decided talent.

2. The new Meier-Seashore Art Judgment Test[3] is designed to discover promising talent and reduce misdirected effort in art. It measures the aesthetic judgment one has for paired pictures, one as painted by the artist at his best, the other with some critical element of the same

[3] Meier, H. C., Seashore, C. E., Art Judgment Test. Bureau of Educational Research and Service, State University of Iowa, Iowa City, Iowa.

picture altered or reconstructed. The test does not specify which specific aptitudes are being measured on each picture but the general outcome is a measure of one's feeling and knowledge for aesthetic judgment and the twenty or more other such art factors as balance, rhythm, design, harmony, color, and the like. The test is recommended for use in grade 6 and upwards.

3. The test which will be discussed in detail in this paper is the Bathurst, Knight, Ruch, and Telford[4] Professional Tests for Elementary Teachers.

The authors of this test, in their manual of directions, sum up the four present methods of selecting teachers as:

a. By letters of recommendation, usually accompanied by photographs.
b. By grades or marks earned in normal school or college.
c. By amount and kind of previous experience, if any.
d. By personal interview.

They further state as the basis for the function of their aptitude test:

"The Professional Tests for Teachers are intended as aids to the superintendent in the selection, placement, and rating of teachers. The Aptitude Tests will help the superintendent to answer the question, 'Do I wish to employ this teacher?' It should not be forgotten that the experimental literature on the worth of the personal interview, the letter of recommendation, the photograph, and the college record is in general somewhat disquieting as to the worth of methods widespread in application and uncritical in interpretation. This published evidence can fairly be said to point towards the conclusion that objective checks on prevailing selection methods are almost a basic necessity.

"The Professional Tests for Teachers are not substitutes for present methods of teacher selection. Rather, they offer additional data on the qualifications of prospective teachers which are not otherwise available in useful objective form."

The test itself is composed of six parts:

Test No.	Title	Type of Items	Number of Items	Time Limit Minutes
1.	Professional judgment	5-response	28	15
2.	Theory and practice of teaching	True-False	85	20
3.	Reading comprehension	Questions	25	25
4.	Social information	4-response	24	8
5.	School and class management	True-False	55	15
6.	Professional information	True-False	33	7
	Total		250	90

[4] Bathurst, J. E., Knight, F. B., Ruch, C. M., Telford, F., Professional Tests for Elementary Teachers. Bureau of Public Personnel Administration, Mills Building, Washington, D.C.

The following table shows how the final score for each part of the aptitude tests is to be computed:

Test	How score is to be computed
1.	Number right
2.	Number right minus number wrong
3.	Number right
4.	Number right
5.	Number right minus number wrong
6.	Number right minus number wrong

In discussing the adequacy of measuring units and validity, the authors say:

"The measuring units of the aptitude tests are adequate for elementary teachers as is shown by the fact that there are few high scores and few low scores, that the highest score does not equal the possible score, and that the lowest score is greater than zero. The predictive value of the aptitude tests relative to elementary teachers was determined by correlating the scores on the tests with judgments of superintendents and supervisors who had observed the teaching efficiency of each teacher judged for at least nearly one school year. The multiple correlation between the judgments and the scores on the various tests was found to be .414, P.E. .041. When corrected for attenuation this coefficient becomes .524 (Pearson r). The standard deviation of the rankings of the superintendents and supervisors was 10.45, and that of the composite scores on the tests, 28.48. Probable error is 5 points."

According to the studies which the authors have made, the tests select teachers with greater accuracy than any combination of such factors as abstract intelligence, grades given in professional courses, and physique.

Two forms of the tests are now available and a third is in preparation. These tests are being used by superintendents, boards of examiners, teachers' colleges, normal schools, and normal departments in colleges and high schools in almost one hundred school systems. The norms have been standardized, but the authors of the test feel that, as the norms are based upon the results obtained with experienced teachers in many school systems, most of them more progressive than the average, they may be too high. Additional data seem to bear out this opinion concerning the norms.

It is to be expected that practice teaching students who have had but two years of training will not equal the norms established by experienced teachers. With our own students, we have never been able to attain the standard norms. We now have the ratings upon 90 students who have had no teaching experience and who were given Set I of the Aptitude Test just before beginning their practice work. These students have had no course in tests and measurements and their lack of knowledge in this regard seems to be a serious handicap in taking the test. The median for our inexperienced students is near the lower quartile standard norm for experienced teachers. In one city teachers' college, which maintains a highly selective group of students and has a

system which eliminates poor students by the end of the first term, the median for 98 students was about the same as the standard median. The data do not show, however, whether any of these 98 students had had teaching experience or a course in tests and measurements. The sixth part of the test can scarcely be successful in outcome without such a preliminary test, or some teaching experience where a school testing program was carried on. Our 90 students with no teaching experience and no preliminary course in tests and measurements have a median of 0 on Part VI of the Aptitude Tests for Teachers, the test of Professional Information.

The type of questions which these fifth term normal students find the least and the most difficult are interesting. The following summarizes some of the results:

	Missed by
I. Professional Judgment	
Easiest	
13. The word most frequently seen in print among the following is (1) bedroom, (2) beset, (3) congenial, (4) beneath, (5) concealment.	6 out of 90
18. If you are teaching in a community with knowledge that a great deal of opposition exists towards dancing, you should (1) insist on your full social privileges, (2) dance only at private parties, (3) go to neighboring towns to dance, (4) seize every opportunity to convince the community of its error, (5) accept the situation as it is and do not dance.	13 out of 90
Hardest	
7. The percentage of pupils who are above the average in grammar is about (1) 10 per cent, (2) 25 per cent, (3) 35 per cent, (4) 40 per cent, (5) 50 per cent.	88 out of 90
8. The most important cause of elimination from school among the following is (1) low mentality, (2) poor eyesight, (3) ill health, (4) poor teaching, (5) work at home.	83 out of 90
II. Theory and Practice of Teaching	
Easiest	
25. Brooding over disappointment is a good mental relief.	0 out of 90
3. The mental attitude of a pupil has little to do with efficient work.	1 out of 90
Hardest	
33. The range of correlation coefficients is from zero to plus or minus 100.	85 out of 90
18. Normal individuals never have delusions.	84 out of 90

		Missed by
III.	Reading Comprehension	
	Easiest	
5.	Which came earlier, class assignments or individual assignments?	21 out of 90
6.	How do pupils recite under the class method?	22 out of 90
	Hardest	
14.	What is the least predictable thing about an individual's responses?	85 out of 90
8.	What statement of the author harmonizes such varied responses as the laughing and crying of a child at the sight of a dog with his views on predictability?	83 out of 90
IV.	Social Information	
	Easiest	
10.	To "double cross" a person means (1) to express approval, (2) to express disapproval, (3) to support a person in trouble, (4) to deceive a person.	6 out of 90
17.	To "high hat" a person means to (1) snub him, (2) tease him, (3) cultivate his friendship, (4) ask for a loan of money.	6 out of 90
	Hardest	
23.	Senator Lodge was (1) an open enemy of the League of Nations, (2) an open friend of the League of Nations, (3) non-committal about the League of Nations, (4) desirous of postponing action for five years.	83 out of 90
16.	Babson is well known in (1) politics, (2) finance, (3) science, (4) literature.	82 out of 90
24.	To "mend one's fences" means (1) to exercise to increase one's health, (2) to collect old accounts, (3) to increase one's political strength, (4) to catch up with one's work.	82 out of 90
V.	School and Class Management	
	Easiest	
23.	If a parent disagrees with the teacher relative to a certain method of teaching, the teacher should adopt the method suggested by the parent.	3 out of 90
22.	The humidity of the air of a classroom affects little, if any, the health of the child.	4 out of 90
30.	Recent investigations have shown supervised study not to be valuable.	5 out of 90
	Hardest	
4.	Not more than ten minutes of each period should ever be devoted to drill exercises.	84 out of 90

	Missed by
20. Sarcasm, ridicule, and satire should not be used as punishments.	76 out of 90

VI. Professional Information

Easiest

1. All pupils are endowed with equal musical ability.	4 out of 90
6. Lack of interest on the part of the pupil will not affect his reading efficiency.	8 out of 90
9. Two major problems of language development are vocabulary and sentence structure.	8 out of 90

Hardest

28. Ill-nourished children are invariably pale and emaciated.	87 out of 90
29. Seashore is the author of Completion Test Language Scales.	85 out of 90
33. The percentile increment of the growth of a child is greater between the ages of 12 and 14 than at any other period.	82 out of 90
18. The aim of spelling is to develop the ability of spelling specific words, not a general ability to spell.	81 out of 90
3. Terman is the author of the Stanford Revision of the Binet-Simon Tests.	79 out of 90

Aptitude tests seem to have achieved a permanency which we cannot overlook. But we know they are far from perfect. Dr. Hull's general criticism of professional aptitude tests is that, because they are constructed by educators, they are too narrowly academic and their validity is judged too much as the criterion of academic success—school marks and ratings of teachers as to intelligence. He further says that, tho there is notable correlation between academic success and success in life, it would seem desirable for a wider range of behavior to be sampled. He recommends that these too academic aptitude tests include more of the items concerned with the manual and mechanical behaviors, with items that forecast type aptitudes and one's general prudence in personal affairs.

We shall continue to use the Bathurst Aptitude Tests for Elementary Teachers in our school until sufficient data can be secured to see whether the test aids in predicting success in practice teaching. Meanwhile, it behooves us all to maintain an open mind to the field of aptitude testing and to lend our efforts toward a successful solution of the present difficulties.

Trade Tests

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WITH a group such as this is I do not believe I need to go into general details about the development of tests. I do feel, however, that I should call your attention in the beginning to some facts about the field of industrial education that probably do not apply to many other fields of educational testing.

The industrial field is in the first place very new in comparison with the fields covered by the academic subjects. The first introduction of any of this work into the public school system occurred in Boston in 1821, when William B. Fowle introduced drawing. It was not until 1876 that exhibits from Russia, at the Centennial Exposition in Philadelphia, interested President Runkle of the Massachusetts Institute of Technology and M. C. Woodward of St. Louis. This gives a period of about fifty years since the work started.

We therefore have just cause to consider that the field is not as yet a settled one and that reasons for standard practice may be apparent.

The field differs in another way. In most of the fields where tests of accomplishment have been devised, the element of knowledge and the element of skill are clearly set apart and defined. For example, in the field of mathematics or in the field of handwriting or typewriting the skill factor is the predominating one. In the field of industrial work, however, we have, I believe, an almost equal balance between skill and knowledge. Not all workers in this field believe this to be true or, if they do, the evidence as shown by the results of tests does not bear it out. In 1922 a knowledge and a skill test in woodwork, that I had been trying to develop, was tried out in the city of St. Paul. Pupils in some schools ranked high in skill and low in knowledge tests while in other schools the position was reversed. Where there is a lack of agreement, of course, there is a lack of uniformity of teaching and a great variety of results occur.

Some people maintain that the resulting product is sufficient evidence to evaluate skill and knowledge. This has not been my experience and I feel sure that we have many cases of reasonable skill and very little knowledge, or the reverse.

In this field, then, we must divorce the two factors for purposes of testing, and the tests which have been worked out by others as well as myself have been developed with that thought in mind.

One stumbling-block in the minds of many people, which they think precludes definite measurement, is that we have such a diversity of aim for the work. In actual trade training we are agreed that an ability to do the job is the chief aim but, when we think of the work as industrial arts, we have no such agreement.

Mr. Sylvan Yeager, in his master's thesis for this institution, selected twelve aims for the work and the teachers over the state ranked them equally into first and last place. Mr. Warner, of Ohio State, in a similar way, found approximately the same results.

These arguments fail, however, because of the fact that a study of schools all over the United States shows that the articles worked on and the principles taught are very uniform. Pick any course anywhere in woodwork, drawing, printing, or machine shop and you will find that the operations and principles taught are very much alike, whatever the aims. A teacher in New Hampshire or one in Illinois will teach about the same group of fundamental facts. In printing, for example, the knowledge of the case, the stick, the stone, paper-cutting, and presswork are the same. This is also true in the other fields of industrial arts.

Mr. Selvridge, of Missouri, states it very clearly in his analysis of teaching industrial or trade work. What do you expect the pupil to be able to do? And what do you expect him to know? Any teacher in answering those statements will give approximately the same answer as any other if he sticks to concrete statements and does not mask them behind glittering generalities.

This situation makes it fairly easy to pick out statements about fundamentals and from these to develop tests of knowledge. When you ask the question, What does a boy need to know about woodwork, drawing, printing, or machine shop work? all you have to do to make a test is to find enough statements for the test that a reasonable number of instructors will agree are fundamental and write them down. It sounds rather simple but we have spent something over three years doing this after experimenting with a variety of other tests over a period of six years.

In the first place, the statements have to be clear and positive, and they have to be arranged in logical sequential order.

In the second place, the statements have to cover the whole field in such a way as to make valid the effort to test the field as a whole. Their validity can be judged by comparing the results with the curve of probability.

In the third place, it was necessary in the tests we used to make them sufficiently simple and easily given that the teachers would use them.

I do not need to discuss the first two points but the third one may need a little explanation. The men in the industrial field are to a great extent unfamiliar and untrained in the giving of tests. We attempted to condense them so that they could be given in the shortest possible time and still be reliable. We also attempted to make the grading a very simple matter.

We felt that a test that was not used was of no value to the schools. We believed that, if it was used, it would be a valuable aid in promoting better teaching and more uniformity of results. The scoring of the true-false statements has been made easy by using a key arrangement—three true, two false, one true, one false, two true, and three false. The scoring of the completed statement was done on the basis of printed keys which accompany the tests.

Some may say that the boys will discover the keyed order and answer the test by using it. They will not discover it while taking the test because, out of some two hundred teachers who gave the tests, not one noticed it while grading the papers until their attention was called to it. Even if they did discover the order, it would take longer to follow it thru than it would to check the statements from their knowledge. The tests are timed and such an attempt would slow up the work of the pupil.

The tests have been developed for use in the ninth grade or above. They were tried out in the seventh and eighth grades in many cases, but the results in general were negligible. Evidently the amount of knowledge secured in these grades is rather small. The test scores have been standardized on the basis of semester grades. Eighteen weeks of work, two periods per day, amounting to 120 to 135 hours of work, is the basis for a semester score. In making up the median scores any records of less than 120 hours were not used.

Some interesting facts appear when we study these median scores. It is quite evident that the amount of knowledge gained after the first semester is not as great as for the first semester.

It is a fact, of course, that a certain amount of knowledge must be had in order to perform the operations, but it would look from these results as if it must be skill that increases rather than knowledge after the first semester.

A study of the range of median scores secured from various teachers and their groups for one semester's work is interesting. In the machine shop test we find the least range. The low median for any teacher's group is 35 and the highest is 79, making a range of 44 points. The woodwork stands next with a low median of 14 and a high one of 68, making a range of 54 points. Mechanical drawing has a low median of 15 and a high median of 74, with a 59 point range. Printing has a low median of 25 and a high median of 90 with a range of 65.

We might be inclined to make some conclusions from the facts that woodwork and drawing show a lower range than machine shop and printing. We might reasonably expect these two subjects, which have been taught the longest, to be better organized. It would be unwise to draw such conclusions, however, because the woodwork and drawing records include scores from small schools while the machine shop and printing records do not. The last two subjects are only found in the larger schools. The cause for lower medians might be poorer teaching in the smaller schools.

We are told by the latest theorists that each community should test its own program and not try to meet standards based on a wide distribution. The academic subjects made have been studied sufficiently so that each community can do this and still maintain a high standard. We are of the opinion, however, that in industrial and trade work general standards to measure up to are more desirable. The academic fields have been carefully studied, but we are only beginning to study the industrial field and, until we have more facts to base judgment on, we feel that a general standard is better.

Psychological Tests in Ball Teachers College

ROBERT C. SCARF, Assistant Professor of Education, Ball Teachers College, Muncie

MY talk for this evening has three parts. Each of these parts has a name, and the names are Clarence and Clara and Paul. Clarence and Clara and Paul are students in our school, and I should like to tell you something about each one of them.

Paul came to our school as a freshman a year ago, and, as he was in my classes, I became well acquainted with him. He is an interesting young man, and I often talked with him and found that two of his outstanding characteristics were a genuine interest in country life and a determination to be a country teacher. Following this determination, he did get a job in a one-room country school, and has been teaching there this past winter. A few weeks ago he was back at the college for a day or two, and I was much interested in seeing him again and hearing him tell about his experience. He was bubbling over with enthusiasm, and he loved to tell about his work. He told me how he taught reading, how he taught arithmetic, how he coached basketball, and many other things. I thought his method of teaching reading seemed a little unpsychological, and I afterward consulted my colleagues who deal with reading and found that Paul's method was almost the worst that could be devised. When he described his arithmetic teaching, I had to hang my head in shame, for I, myself, had taught that boy how to teach arithmetic, and he was doing everything that I had told him not to do.

But when Paul told me about his basketball team, I got an insight into another phase of teaching, and one which is not less important than method. Paul's trustee, it seems, likes basketball, and Paul has a basketball team. Paul's trustee wants this team to play on Friday afternoon. Paul told me, with charming naïveté, that, in order to make up for time lost, he keeps his children in during part of the noon hour each day, and hears the recitations which are scheduled for Friday afternoon. "Shades of Jost and Meumann," I said to myself, "this boy went thru a course in psychology where he heard all about the distribution of time, and about economy in learning."

I was so much interested that I went, later on, to the records in the registrar's office to find out what I could about Paul. At our school we give all our freshmen a series of tests when they enter. I can say one thing, at least, about the people at Muncie; when they go into anything, they go into it thoroly. We have, like most other schools nowadays, a Freshman Week. The freshmen spend a whole week in taking a great variety of tests and listening to a great variety of lectures. When the week is over, we are sure of one thing,—we are sure that freshmen have plenty of endurance, and so we let them in.

Well, I looked up Paul's scores on all of these tests, and they were all low. They were very low. I looked up the marks he had made in his courses, and they were low; he had just barely kept his head above water scholastically. If one went no farther than the registrar's office and the test results, one would feel rather doubtful about Paul. And yet this boy has one trait that marks him for success. He knows how to get along with his trustee. This trait, I think you will all agree, is a very useful one for a teacher to possess. It is Paul's outstanding characteristic, and yet our elaborate testing program fails to tell us anything about it.

A few days ago a girl came to my desk, introduced herself as Clara, and said that she was having trouble. I inquired what the trouble was, and she replied that she couldn't spell. This is a trait which is common enough among freshmen, and most of them accept it with equanimity, but Clara was worried. I asked Clara to bring in her notebook, and went thru it, page upon page and line upon line, noting every misspelled word, and finally concluded that Clara really could spell. It is true that there were misspelled words, but not many, not more than most freshmen would show upon a similar examination. I then looked over the list of misspelled words and found, as anyone would expect, a certain consistency in the misspelling. Clara had the habit of omitting a letter. This is easily explained, for Clara has a slight speech defect, and in long words often omits a syllable or a sound when speaking. This fault is naturally reflected in her spelling. I asked her what she was doing about her spelling, and found that she was trying faithfully, and working hard and long at her spelling. Alas, her method was all wrong. At some time in Clara's school career, she had met a deluded teacher who made pupils spell each misspelled word two hundred times. Clara reasoned, and with some logic, that if two hundred times is good, more would be better, so every time she felt doubtful about a word, she looked it up in the dictionary, copied it out faithfully, and wrote it one thousand times, spelling it orally, letter by letter, each time. What industry, what persistence, what faith—and such a small reward!

The treatment was simple. Clara needed to be given some confidence in her spelling ability, she needed to be shown that a single habit accounted for most of her poor spelling, and she needed, most of all, to be given a sensible method of learning to spell. All this could be done in a few short lessons, but the point is that all our testing failed to tell us the essential things about Clara. The important facts are that she lisps, and that she worries about her spelling. These things tests will not tell us. Still more important is the fact that Clara had adopted such a poor method of learning that the harder she tried, the worse, in all likelihood, would her spelling become, and no test has ever been devised which will tell us that. Our whole week of testing failed to tell us those things about Clara which are most important for us to know.

I turn to the third of this trio of students with the pride of an exhibitor. Clarence is my prize specimen. He was introduced to me not long ago by a note from the dean's office, a note which asked me if I could find out something about him, and whether there was any ex-

planation for his difficulties. Attached to the dean's request were two or three reports from his instructors, all complaining especially about the boy's poor English. One of these reports was so interesting that I shall try to tell you what was in it, altho two of the words are so long that I am afraid that I can't pronounce them. This report came from an English instructor, who, driven to distraction by the boy's mistakes, forsook his own and resorted to the classical languages. To decipher Clarence's themes, he said, was a feat, a feat of thaumaturgic prestidigitation—well, I looked in the dictionary, and then I sent for Clarence. I knew him well. He was in one of my classes, but I had paid very little attention to him. I had, however, noticed that his written work was very poor, and I had a dim memory of scribbling more than a fair share of red pencil marks across his paper, to indicate errors in English. English, in fact, was the boy's great trouble.

I naturally looked first for Clarence's record on the freshman tests, and there I found a very interesting situation. His scores were pretty low on all the tests except arithmetic, and there he shone. He was well below average in all the other tests, but in arithmetic he was not far from the top of the class. This was a most unusual thing among our freshmen, and I studied the tests further, and particularly the intelligence test. There I found the same sort of thing. The intelligence test which we used contains some arithmetic problems and some geometrical material. With these Clarence did well, but on the linguistic parts of the test he was a lamentable failure. Clearly, here was a boy who had a good mentality, but who had failed to learn the language.

The next thing, obviously, was to study Clarence's performance on the language test that we give to freshmen. At first sight his score was discouraging. He was the next to the lowest in the entire freshman class. But a detailed study of his performance on this test gave ground for hope. Some things he could do. He could use "who" and "whom" properly; and he could use the proper forms of "lie" and "lay." He could distinguish between phrases and clauses, and he could identify the parts of speech. He could not spell, and he could not punctuate, and he could not distinguish between simple and complex sentences. It was his failure in these phases of English that gave him such a low score on the test as a whole. It seems fair to suppose, however, that if a boy can learn about "who" and "whom" and about "lie" and "lay," and about phrases and clauses, he can learn other things about English if he is properly taught.

To carry the story a little further, I asked Clarence to bring me his notebooks and some of the papers that he had written for various instructors. He had none. I think it is a very significant fact that Clarence destroyed all his written work. Clearly written work was a bug-a-boo to him. By dint of some urging, however, I got him to bring me a few themes. I can't describe them; words fail me. They were the worst I have ever seen. There seemed to be a mistake in every word. And yet, close study revealed a few bad habits that were at the bottom of most of his errors.

One of his habits was omitting the letter "s" when it occurred at the end of a word. This letter is very important in English and its

omission leads to weird results. Without the "s," nouns which poor Clarence meant to be plural looked like singulars, and verbs which he meant to be singular looked like plurals. As a result, his written work was an amazing confusion of singular and plural. No wonder that his instructor in English must resort to the classical languages to relieve his feelings. Surely, I thought, this is a simple habit, this matter of affixing an "s," and I undertook to instruct Clarence. A few minutes a day for a few days brought what seemed to be good results, and some weeks later I tested my teaching by inspecting a paper which Clarence wrote in my own classroom. Behold, there was a final "s" flourishing gloriously in every place where one belonged. But I hasten to add that in another paper written the same day in his English class, every final "s" was omitted—an excellent example of the way in which training does not transfer. Furthermore, I noticed that, as Clarence overcame the habit of omitting the final "s," he grew worse in another habit, that of omitting the "ed" in the past tense. It appears that training Clarence into good habits in English would be a long and arduous process.

The causes of Clarence's condition are of course very complex, but some major causes are easy to discover. Clarence is left-handed and he stammers. He has had a speech difficulty, he says, ever since he was three years old, and probably before that. His father died when he was quite young. He went to school several years to a sister who stammers. He has always had poor school marks in English, and he has always been ridiculed at home for this, and compared unfavorably with his older brother, who was a brilliant student. When he began school in the first grade, the other pupils made fun of his speech. For twelve years every one of his teachers tried to make him write with his right hand, and every one of them failed. Clarence, with more wisdom than his teachers, resisted their efforts. Every year, from September until Christmas, Clarence wrote with his right hand. Every year, from Christmas until June, he returned triumphantly to his preferred hand, and wrote as he chose. The effect upon his language habits I leave to your imagination.

Is it any wonder that, after years of this kind of mistreatment, he hates and dreads language expression? The fact is that Clarence is a case for a psychiatric clinic; the ordinary staff of an ordinary school can do little for him. And what good is our week of freshman testing? The important facts about Clarence are that he is left-handed, he stammers, and he omits a final "s." None of these facts will be revealed by the most elaborate testing program.

As I think about the three freshmen that I have described, and then think about all the work we have done with freshman tests, I am driven to a single conclusion. After all the means and deviations and coefficients have been computed, after all the graphs are drawn, after all the predictions and estimates are made, and their equations written, we must lay all this statistical paraphernalia to one side, and get down to one fundamental fact. That fact is that no two freshmen are alike; and each of them has numberless traits and capacities which our standard tests will not reveal.

A Report on the Late Dr. H. G. Childs' Study of Factors Entering into Successful Teaching

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THE report on Dr. Childs' study is not printed in the proceedings of the conference, since the study will soon be completed and will then be published separately as a bulletin of the School of Education.

The Use of Teacher Rating at Purdue University and its Implications for the Elementary and Secondary Schools

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AMONG the various factors in a teacher-learner situation the attitude of the learner toward his teacher has always been recognized as one of the most important. We know, for example, that in connection with one of the fundamental laws of learning, the law of effect, the attitude of the pupil is fundamental. This attitude has much to do with the pleasantness or unpleasantness which accompanies the stimulus-response connections. It would probably be accepted without evidence that, where the attitude of the pupil toward the instructor is favorable, that is, where the pupil has admiration and respect for his instructor and the instructor's classroom methods, the desirable stimulus-response bonds will be formed more rapidly and more smoothly, and will be retained for a longer period of time. While this factor has long been recognized as an important one in the learning process, little attempt has been made to deal with it in a systematic and quantitative fashion.

Attitudes are difficult to evaluate with precision under the most favorable conditions. And the attitude of a pupil toward his teacher is popularly believed to be of such an intangible, elusive, and fluctuating nature that any attempt to treat it objectively and quantitatively is bound to meet with failure. With the development, however, of techniques for more accurate evaluation of mental abilities, capacities, and attitudes, we are no longer entirely helpless in the face of such obstacles as confront us in the attempt to measure such factors.

The Purdue Rating Scale for Instructors represents an attempt to deal in a more effective manner with this one important factor in the learning process, namely, the attitude of the student toward the instructor's classroom personality. The term "classroom personality," as here used, refers to the reaction of the student to the various qualities of the instructor as exhibited thru his classroom activities. In discussing the use and implications of this device it should be kept in mind thruout that the sole purpose of the scale is to evaluate the attitude of the student toward the personality of his instructor as exhibited in the classroom. It should be specifically pointed out that we are not proposing to measure or rate the total value of an instructor to his institution, to the community, or to the state, neither are we attempting to

evaluate his training for instructional work, his capacity for research work, or his value in numerous other ways to an institution. Furthermore, it should be stated that we are entirely conscious, in our efforts to develop a device for the better evaluation of an attitude, that such a device is only a temporary makeshift for a more perfect measuring instrument which must ultimately be developed.

The Purdue Rating Scale is a straight form graphic scale involving ten fundamental traits, as follows: (1) interest in subject, (2) sympathetic attitude, (3) fairness in grading, (4) liberal and progressive attitude, (5) presentation of subject-matter, (6) sense of proportion and humor, (7) self-reliance and confidence, (8) personal peculiarities, (9) personal appearance, (10) stimulating intellectual curiosity.

A question has been raised as to the reason for using the straight form rather than the "staggered" form of scale. To answer this question I shall quote from the manual of directions.

"In order to test the reliability of the scale, (that is, straight versus staggered form) the procedure outlined below was followed. Two forms of the scale were prepared, one in which the traits were 'staggered,' i.e., in which the zero end of the scale and the 100 per cent end of the scale were placed according to chance either at the left or the right margin of the paper, and a second form in which the zero end of each trait was placed at the right. The students who participated in this part of the investigational procedure were asked to rate the instructor on one form of the scale, without their being informed of the existence of the second form. Three days later, when they had presumably forgotten specific judgments on the traits, they were again asked to rate the same instructor on the second form. In order to preserve the anonymity of the ratings while yet making it possible to correlate one form with the other, they had been asked to appoint a class secretary to assign to each student a number. These numbers he announced to the students in the absence of the instructor. On the occasion of the second rating, the instructor again left the room while the secretary made sure that each student had his proper number so that his two ratings could be identified. This made possible a correlation without the instructor's knowing who any individual rater was in terms of his number. In order to divert the students' attention from the real purpose of this part of the study—i.e., a retest—they had been told at the time of the first rating that the class secretary would correlate ratings with mental test scores, which were already available. The students were unanimous in their testimony that they were unable to recall how they had checked the various traits on the first form when they were filling out the second.

"The above procedure was gone through to discover the effect 'staggering' would have upon the judgments—whether, as has been claimed, the 'staggered' form would differ significantly from the 'straight' form, in that such staggering would force greater discrimination on the part of the rater by preventing a general mental set which would lead him to rate the instructor about the same for all the traits. Our investiga-

tion on this point gave wholly negative results. As much discrimination was achieved by one form as by the other."[1]

There is no scientific basis for believing that the ten traits selected are the most important personal traits of an instructor in his classroom work. That they are important, no one will question. Neither are we absolutely certain that the number of traits is even approximately what it should be for such a scale. We have made no attempt to determine the number scientifically. Our selection of traits for the Purdue scale has been based upon three principles generally recognized by those concerned with the development of rating schemes as fairly valid. (1) The number of traits used should be relatively small so that the rater would not be lost in the maze of different qualities. The halo effect, which is probably in part due to the use of a long list of traits in a rating process, seems to be largely absent in the use of our rating scheme. The coefficient of correlation between any given two traits has been found in most cases to be fairly low. (2) Traits used in a rating process should be those traits upon which competent critics agree as the more fundamental ones. (3) Traits used should be of such nature that they can be observed and judged by those who are supposed to do the rating.

As to the specific traits used in the Purdue Rating Scale, their selection was somewhat arbitrary. The best justification we can offer for the selection is that they are found in the list of most desirable qualities for college instructors worked out by the "Better Yet" Faculty-Student Committee in the Quality of Instruction in Elementary Courses in the University of Chicago.

A list of more fundamental traits than those which are used in the Purdue scale might be devised. Careful investigation might indicate that a greater or less number of traits should be used. It is my own conviction that the matter of just what traits are used, and the particular number of traits used, is not of great importance so long as one adheres fairly closely to the principles enumerated above.

A fundamental consideration in connection with the development of any rating or measuring instrument concerns its reliability and its validity. The term "reliability" is used in this paper as it is generally used in measurements discussions to indicate consistency or constancy. A measuring device is reliable if repeated applications produce similar results. A measuring device is valid if it measures what it is presumed to measure.

Concerning its reliability of results obtained thru the use of the rating, I shall quote from a recent bulletin, *The College Professor as the Student Sees Him*, by Professor H. H. Remmers:[2]

"In a recent study it was shown (1) that students agree very markedly as to the ten traits of the rating scale, (2) that they discriminate very well among the different traits for a given instructor,

[1] Brandenburg, G. C., and Remmers, H. H. *Manual for the Purdue Rating Scale for Instructors.* Lafayette Printing Company, 1928.

[2] H. H. Remmers, Ph.D. *The College Professor as the Student Sees Him.* Purdue University *Studies in Higher Education* VI, pp. 17-18.

and (3) that each of the traits of the scale 'adds something to the total picture as seen by the student.'

"This internal consistency of the students' ratings is obviously a question of reliability—i.e., the accuracy with which the instrument measures whatever it does measure. The best index of reliability is the coefficient of reliability, that is, the self-correlation of the scale when administered at two different times. The evidence is that the scale as a whole has a reliability of between .60 and .85 for classes containing approximately 30 students. The reliability of student judgments on a single trait appears to be approximately .60 for a similar number of judges.

"It is known that reliability increases with an increase in the number of judges. This increase is apparently predictable according to the Spearman-Brown prophecy formula. Assuming that the formula applies, it requires about 100 to 120 student judgments of an instructor to make the reliability of the rating scale comparable to that of the best standardized mental and educational tests now available."

It thus appears that the Purdue scale is sufficiently reliable for practical purposes when used with proper precautions.

As to the validity of the scale I shall again quote from page 14 of the manual of directions:

"With the use of any measuring instrument the question always arises, Does it measure what it purports to measure? With standardized tests or with the new type of 'objective' classroom tests the asking of this question not infrequently leads to a serious indictment of the test on the score of validity, for it can often be shown that the test in question is no more a test of arithmetic, geography, history, psychology, or what not, than it is a test of reading speed or comprehension, speed of handwriting, or of ability to follow directions.

"The Purdue Rating Scale for Instructors is not open to this general criticism. It purports to measure the students' judgments of the instructor on the ten categories given on the scale. To the extent that students agree among themselves on the amount of the trait which the instructor possesses, and, more important, the extent to which each student is self-consistent in his judgments, to that extent we are in a position to say that the scale is valid. For this scale reliability is synonymous with validity." Reliability of the ratings having been established, it follows that the ratings are also valid.

The justification of the use of any such device as we are here discussing is largely in its value as a means of improving the instructor's classroom procedures and hence the teacher-learner relationship.

Now it is quite obvious that improvement in the instructors' teaching techniques may come about in various ways. It is entirely reasonable to believe that, in the case of college instructors, if indeed not in the case of all teachers, best results in the way of improvement will be secured where the instructor takes the initiative. In other words, self-improvement or self-initiated improvement is likely to be more effective than externally initiated improvement. I do not feel at all certain that

it would be desirable to attempt to impose upon college instructors the same methods for the improvement of instructional work which are used in the public schools. It is entirely conceivable that attempts to supervise the college instructor's classroom procedure and to superimpose upon him any great amount of standardized technique in his teaching would cause the more capable scholars to hesitate to enter the teaching profession and the most valuable men in a faculty to seek employment in other fields. For is it not true that one of the chief compensations which comes to the college instructor is the relatively greater freedom which is permitted him in his work and the relatively greater opportunities allowed him in using his own ideas than is the case in business and industry? In any case personal supervision of the college instructor's classroom procedure should not be accepted as sound and desirable educational practice until scientific experimentation has demonstrated its usefulness and its validity.

A rating scale which the instructor can use of his own volition furnishes a device thru which he is enabled to discover quickly and easily the attitude of his class as a whole as well as the attitudes of the individual members of his class toward his teaching procedures. He is thus enabled to make his own self-diagnosis. Extensive experience with the Purdue Rating Scale in one institution leads me to believe that three major types of beneficial results are likely to accrue from its use.

1. Certain instructors are encouraged in their work thru the discovery that there prevails in their classes a better attitude and a keener appreciation of their efforts than they were aware of.

Mr. X, for example, is a young instructor with adequate training and outstanding mental qualities but with a thorogoing attitude of depreciation of his own abilities. He imagines that his students tolerate him in the classroom because they have no alternative. After nearly two years of wishing and not daring to try the rating procedure, he finally persuaded himself to risk it. Naturally the results were greatly to his credit and the effect has been to add somewhat to his self-confidence as well as to his enjoyment of his work.

2. Some instructors discover that there exist in their classes certain unfavorable attitudes and they are led thru such discoveries to attempt to improve their classroom procedures in an effort to modify the unfavorable attitudes.

May I again refer to a specific case? Mr. Y, teaching his second year in the university, had somewhat unconsciously developed a strong tendency to use sarcasm in his classroom discussions. It was a surprise to him to discover thru a study of his student ratings that this was reacting upon his work in an adverse manner. Use of the scale in the same class some time later, and after conscious effort to eliminate the use of sarcasm, showed a marked rise in the average of his ratings on the ten traits. The following table shows the details of changes made in his ratings:[3]

[3] From Brandenburg, G. C., and Remmers, H. H., *Manual for the Purdue Rating Scale for Instructors.* Lafayette Printing Company. 1928.

Traits	First Rating Averages	Second Rating Averages	Average Improvement
1. Interest in subject	82.4	82.3	—0.1
2. Sympathetic attitude toward students	64.4	64.3	—0.1
3. Fairness in grading	83.9	81.4	—2.5
4. Liberal and progressive attitude	81.4	80.6	—0.8
5. Presentation of subject-matter	73.9	77.7	+3.8
6. Sense of proportion and humor	65.5	80.9	+15.4
7. Self-reliance and confidence	65.9	80.5	+14.6
8. Personal peculiarities	68.8	81.4	+12.6
9. Personal appearance	87.4	89.8	+2.4
10. Stimulating intellectual curiosity	73.0	79.4	+6.4

3. The use of the scale generally in an institution leads to an increase in interest in teaching problems on the part of the instructional staff as a whole.

Shortly after the opening of the first semester at Purdue University in 1928 an announcement was made to members of the instructional staff that the university would furnish the Purdue Rating Scale to members of the staff who were interested in its use. During the semester 212 instructors, approximately 85 per cent of the teaching staff, availed themselves of the opportunity to use the scale. No evidence is required to show that this procedure resulted in a great amount of interest and of discussion of teaching problems.

It is entirely conceivable that the process of obtaining student judgments of instructors might lead to an increase in student criticism of instructors and a general decrease in student respect for a teaching staff. We have found no evidence of such a tendency. In fact the student seems to regard the matter as a part of the daily program and pays little attention to it after the paper has left his hands. I do not mean to imply that students do not in many cases enter into spirited discussions of the relative merits of their instructors. Such discussions can hardly be held to be wholly undesirable.

It has been contended by some that, in case an instructor's ratings turned out to be rather low, he would become seriously discouraged in his teaching. Again it must be pointed out that we have found no evidence of any more than temporary disturbance of this sort. Furthermore, it is reasonable to believe that some such stimulation—discouraging even tho it might be—might have certain beneficial effects in the case of an instructor who would receive such low ratings.

While the Purdue Rating Scale has been used to some extent in secondary schools, it must be admitted that, as yet, we have no adequate basis for any statement as to the possibilities of its usefulness in such schools. It is possible that the immaturity of judgments in high school pupils would be a serious obstacle to its use. It is also not unreasonable to believe that the use of the scale at the high school level might lead to some disturbance in the morale of the school. Such assumptions should and will ultimately be tested in the same manner that they have

been tested in the university. I am bound to point out, however, that the teacher-pupil classroom relationship has the same relation in general to the learning situations in the secondary and elementary schools as it does in the college. In fact, it would be a reasonable assumption that the effect upon the learning process of the attitude of the pupil toward his instructor is in inverse proportion to the pupil's mental maturity.

While it may not be possible to make use of such a rating scheme in the elementary schools as is described in this paper it is not inconceivable that some equally effective device could be constructed by which the elementary teacher could obtain reasonably reliable measures of the attitudes of her pupils.

That such an instrument would be fully as valuable as a means of improving the teacher-learner relationship in the elementary and secondary schools as in the colleges can hardly be questioned.

The Improvement of College Education

MELVIN E. HAGGERTY, Dean of the School of Education, University of Minnesota

THE American liberal arts college is a changing institution. This observation merely connotes the fact that the college is a plastic agency responding to the changing interests, needs, and capacities of the society which supports it. While many of these changes are largely ephemeral, they are, also, to some degree symptomatic of economic, social, scientific, and spiritual disturbances that unsettle the ever-crystallizing forms of college organization and procedure.

The most descriptive term applicable to American colleges during the past decade is "increase"—increase in number of institutions, in size of institutions, in total number of students, in variety of curricular and non-curricular activities. The changing conditions thus suggested have made fertile soil for the development of new methods of dealing with students, a movement frequently stimulated and always abetted by the young sciences of psychology, sociology, and education.

While these changes have been stimulated and in some ways forced by economic and social changes occurring in American society, it is a matter of profound moment that college administrators and others who have had to deal with new conditions have undertaken to study the problems of college education by all the methods which scholarship has devised. Widely thruout the country there has developed an enlivened interest in the whole matter of college education and an altered attitude toward many of its problems. Some of these changes have recently been canvassed by the writer and reported in the 1929 *Yearbook* of the National Society of College Teachers of Education.[1] In this canvass there appeared very strikingly a tendency largely absent from the discussion of college problems a decade ago, a tendency to investigate and experiment with educational issues, an effort to inject into discussion both the spirit and something of the methods of study characteristic of the scholarly investigations which have made such astonishing headway in other fields of learning.

A survey of published literature has also been undertaken, and, altho this analysis is far from complete, it reveals with perfect clearness that college teachers, college administrators, and students of college education are in search of factual data that will enable them to understand better their complex problems and to improve their practices.

Our initial attempt at analysis of the literature is based on an examination of 1,162 titles appearing in the decade from 1919 to 1928, inclusive. This material totals 48,535 pages of 300 words each, in all about 14,500,000 words. This material has found the light thru 128

[1] *Yearbook of the National Society of College Teachers of Education*, 1929. Chap. II.

avenues of publication. These figures are tentative and are certain to be increased as this study proceeds, but the decade would appear to have produced books, monographs, bulletins, and articles in periodicals exceeding in total the equivalent of 100 volumes of respectable size on the matter of college education.

The Extra-Mural Approach

One group of studies consists of those made by agencies outside the institutions in which the study is made. Such studies, in general, involve more than one institution and attempt to study a problem that is shared in common by numbers of colleges.

We may place first in this group the list of publications issuing from the United States Bureau of Education. Within the decade 1919-1928, comprised in our initial analysis, approximately 100 titles are to be credited to this source. Publications range from mere pamphlets of a few pages to volumes of several hundred. In all, they comprise approximately 8,000 pages of printed matter and cover a wide variety of problems from the statistical tables of enrollments and like matters, to the discussion of property, curricula, organization, administration, etc.

In this same period the Carnegie Foundation for the Advancement of Teaching has issued twenty-one publications covering such matters as college entrance requirements, cost of present-day education, the analysis of professional education, college athletics, training of teachers, and other like problems. Our table credits them with about 4,000 pages.

The next most productive organization according to our figures is the College Entrance Examination Board, with 14 titles and 3,000 pages.

Other organizations making substantial contributions are:

American Council on Education—326 pages, 2 titles.
Association of American Colleges Bulletin—981.8 pages, 8 titles.
Association of American Universities Conference Proceedings—49.3 pages, 4 titles.
National Research Council—139.4 pages, 2 titles.
North Central Association of Colleges and Secondary Schools—1021.6 pages, 29 titles.
Transactions of Ohio College Association—178.2 pages, 20 titles.

The figures in some of these cases are incomplete.

Summing up this group of studies, we have a total of 233 titles issued by 22 organizations, the whole constituting approximately 22,132 pages of printed matter, or the equivalent of 55 volumes of approximately 400 pages each.

New Ventures in College Education

In a second division we may group studies centering about what may be characterized as new ventures in college education. The decade has seen the creation of a surprising number of new colleges, most of which are still too much in the developmental stage for any final appraisal of their endeavors. They are frequently described as experi-

mental schools, but they are only partially, or not at all, controlled so far as a check upon results is concerned. Out of dissatisfaction with the existing colleges on the part of an individual or social group, there arises an attempt to create a new type of institution, departing significantly in purpose, clientele, form of organization, curricula, or methods of instruction from the prevailing or traditional college. The creation of such a new college, with a new student clientele, a new faculty, and all the accompaniments necessary to render them effective, is an enterprise of large scope involving much administrative machinery as well as large funds, and its very magnitude and complexity preclude the checking of results in the immediate and narrow denotation of the term. Those whose enthusiasms and inventive genius plan such endeavors are not unmindful of desirable outcomes, but they look for them in the less tangible and unmeasurable achievements and attitudes of their students, in the future lives of their graduates, or in the altered conditions in society.

The name of Antioch, Rollins Stephens, Whittier, Sarah Lawrence, Claremont, and Reed will indicate the grouping we have in mind, and closely related to these are certain radical endeavors and proposals at Wisconsin, Stanford, Michigan, and Hopkins. About all of these new ventures there is accumulating a body of printed matter that should have its interpretation directly in connection with the institutions concerned. Such discussion lies outside our present purpose.

Studies within Institutions

Here we have placed the direct efforts of existing institutions to analyze and study immediate problems while going forward with their customary activities. The assumption in such cases holds that the traditional program of the institution is a worthy one, useful and effective, but subject to improvement in certain of its phases. Experimentation here is more narrowly conceived and more easily subjected to controlled study.

Effort at such experimental study is claimed by a large number of colleges, and a limited number of institutions give ample evidence that college education is to be studied as well as practiced and standardized. From these centers a library of factual knowledge about college education is slowly accumulating, as is evidenced by a bibliography that for the decade exceeds 650 titles.

If we add to these titles the studies by individuals, which in many cases are not easily distinguished from them so far as origin is concerned, and which are even more frequently akin to them in purpose and content, we shall have a total of nearly 1,000 titles, making about 8,000,000 words or the equivalent of 50 volumes.

This array of titles is a striking evidence of the concern which American colleges entertain concerning their own problems. It is equally clear also that some of this material is highly important as throwing new light upon many old problems as well as contributing an analysis and specification of new issues. It is an interesting fact that the prob-

lems of student personnel stand largest in this array, and that problems of the curriculum stand second. This emphasis is in clear contrast to the problems treated in the publications comprising our first group, where matters of administration and organization hold the dominant rôle. It is our view that this emphasis is distinctly encouraging, since it indicates that those who are concerned with college problems are placing first in their thinking the very fundamental educational issue of the student and his curriculum.

It was our thought that the number of institutions to be considered in this connection would be relatively small and that the published material could be quickly surveyed. Our efforts, however, have revealed that approximately 130 colleges claim credit for studies of this sort. If we add to this group those institutions in which a local member of the faculty has made an investigation and published results, the total is more than 200. In other words, from more than 600 colleges and institutions of higher education listed in the *Directory* of the United States Bureau of Education, it would appear that approximately one-third of them have done something by way of investigating the local problems of education.

While the number of colleges in our group is large, the tabulation shows that interest is greatly emphasized in a number of institutions. One institution in particular is credited with more than 60 different titles, and 7 others have 20 or more.

The survey of scholarly studies in college education shows two things. In the first place, the diversity and rapidity of change in college education exceeds all previous experience in this country. The significance of many of these changes is undetermined, but there can be little doubt that some of them are very important and indicative of alterations in the economic and social ideals of the American people. They reflect profound changes in conditions of living and in ways of thinking.

The second inference from this study is that college administrators and teachers are determined to understand better than before the nature of adolescent youth and the educational forces with which they deal. They propose to study these matters by all the technical methods which scholarship, scientific and otherwise, can offer to their aid. More than this, they propose to use their new understanding in the redirection of instruction, curriculum, and organization to the end of improving the educational opportunities of young men and women. They propose to substitute facts for platitudes in the discussion of college matters, and to drive out educational superstition with knowledge and understanding.

One of the reasons why college experimentation has proceeded with rapidity is that modern college faculties are trained in the methods of research. The probabilities are that most colleges are richer in this respect than they may at first think. Experience testifies that, once the idea of investigating college problems arises, aid will be forthcoming from unexpected sources. College presidents and deans are continuously plagued by unsolved problems, and in some cases they have been able to save the time from routine performance to search for the facts upon

which wise decisions may be made and constructive educational policies developed. It is quite probable that more of them could do so if the importance of such a line of action should become clear to them. Much depends upon just this clear understanding of the importance of collegiate educational research.

Much, also, depends upon the resolute will of the administrative officer to defend his own intellectual alertness in regard to the understanding of his own problems. The spirit of the dean who said, "I'll be damned if I'll surrender to routine: I am going to study my job as well as perform it," is widely needed, and evidence increases to show that that spirit is growing. An administrative officer with this outlook will add his own mite to needed knowledge, but he will also do something of vastly greater moment. He will make his institution habitable by scholarly students of educational problems, and will generate in his faculty a sympathy with educational research. He is likely, further, to find that some members of his staff in the strictly academic fields also decline the "damnation of routine," and themselves set about the examination of their own practices with a consequently increased intellectualization of the tasks which they daily perform, possibly with an enlargement of professional knowledge.

Two reasons prevail for the encouragement of a responsive interest on the part of the academic faculty in educational research. In the first place, the faculty is the responsible and, in the end, the only effective agent in the improvement of college education. They who are only students of education can, at the best, do little but produce new facts, and frequently they can do this only with the coöperation of academic teachers. The latter alone are in a position to make new facts useful in college improvement.

The second reason is even more important, namely, that many of the methods of research useful in the study of education have had their origin and their greatest development in strictly academic fields. Education has done less than some suppose in the creation of new scientific methods, but has levied extensively upon the devices and methods of other fields of investigation. This point may be emphasized by an outline of the currently used methods of educational research prepared by the writer with the assistance of his colleague, Dr. W. C. Olson. This outline is as follows:

Methods Useful in Educational Research

1. Documentary—
   - *a.* Historical
   - *b.* Legal
   - *c.* Analysis of current literature
   - *d.* Textbook analysis
   - *e.* Institutional records and reports
   - *f.* State records and reports
   - *g.* Federal records and reports
   - *h.* Catalogs
   - *i.* Courses of study

2. Questionnaire—
   a. Fact
   b. Opinion
   c. Simple information
   d. Variable verbal response
   e. Yes or no
   f. Checking
   g. Ranking
   h. Rating
   i. Weighting
3. Rating scales—
   a. Graphic (cross on the line)
   b. Order of merit ranking
   c. Man to man comparison
   d. Scale sample comparison
   e. Range of values
   f. Score card
   g. Others . . .
4. Personal interview—
   a. Prepared questions
   b. Unstandardized
   c. Trained interviewers
   d. Untrained interviewers
5. Description and analysis based on—
   a. Uncontrolled observation
   b. Controlled observation
   c. Stenographic reports
   d. Verbal analyses
6. Survey—
   a. Population
   b. Buildings
   c. Finances
   d. Organization and administration
   e. Teaching staff
   f. Pupil progress
   g. Curriculum
   h. Educational results
   i. Others . . .
7. Case method—
   a. Individual history
      (1) Health
      (2) Social
      (3) Educational
      (4) Economic
   b. Individual examinations
      (1) Medical
      (2) Psychiatric
      (3) Educational
      (4) Psychological
      (5) Family history

8. Experimental—
   a. Laboratory
   b. Classroom
   c. One group
   d. Equivalent groups
   e. Rotation groups
   f. Learning
   g. Physiological
   h. Psychophysical
   i. . . . .
9. Bases for equation of groups—
   a. Random selection
   b. General intelligence
   c. Status in experimental trait
   d. Socio-economic status
   e. Marks in . . .
   f. Educational tests . . .
   g. . . .
   h. . . .
10. Mathematical formula

The manner in which these methods shoot across the intellectual interests of a college faculty is fairly clear from the mere listing of them. Our Minnesota experience has given us copious illustration of their pervasive character. At one time or another during a five-year period we have had the assistance of men and women from many teaching fields, who have enriched our understanding not merely of the problems to be studied, but also with clear perceptions of the applicability of methods which they knew better than did we. The individual departments will be given later, but it should here be stressed that inquiring minds are not confined to any college or university department.

One of the means which we, at Minnesota, have found most useful in meeting our local situation has been the coöperative investigation. It would not be true to say that, in beginning this program, we anticipated all the helpful relationships which have grown out of our efforts. In the earlier stages, the persons most concerned were largely administrative officers who were facing, in common, certain perplexing problems, and who associated themselves and a small group of instructors, with the president's encouragement, into a committee on educational research. As projects developed out of the discussions of this committee, it was possible to enlist the aid of individual instructors in the work of sub-committees. As these committees have been formed they have usually contained one or two men from education and from three to ten instructors from other departments of the university, the majority always lying with the non-education faculties. The individuals have been drawn from the professional groups as well as from the liberal arts college. The names of these departments will give a vivid picture of how widely interest has been distributed. They are as follows:

Administration
Agriculture
Anatomy
Biochemistry
Botany
Business
Chemical Engineering
Chemistry
Civil Engineering
Dentistry
Economics
Educational Administration
Educational Psychology
Elementary Education
Engineering
English
History
Home Economics
Journalism
Law
Library
Marketing
Mathematics
Mechanics
Municipal and Sanitary Engineering
Nervous and Mental Diseases
Nutrition
Obstetrics and Gynecology
Pathology
Pediatrics
Physical Education
Physics
Physiology
Physiological Chemistry
Plant Pathology
Political Science
Psychology
Romance Languages
Secondary Education
Sociology
Speech
Surgery
University Health Service
Zoölogy

The list of projects will give an idea of the area over which our activities have ranged. They are:

1. Student personnel.
2. The efficiency of instruction in classes of different sizes.
3. An analysis of the marking systems in vogue at the University of Minnesota.
4. The educational value of extra-curricular activities of university students.
5. Alumni contacts.
6. The mental hygiene of college students.
7. Dissemination of research information.
8. Vocational guidance for women.
9. Training for out-door leadership.
10. The college teaching of science—
    a. Laboratory instruction in human anatomy.
    b. The value of laboratory instruction in human physiology.
    c. The value of laboratory instruction in college physics-mechanics.
    d. The effect of class size in college physics—heat.
    e. Some determinants of achievement in college physics—magnetism and electricity.
    f. A study of prognosis in college physics.
    g. A study of prognosis in human anatomy.
    h. Laboratory instruction in college chemistry.
    i. The value of prerequisite course in college botany.
11. The college teaching of the social sciences.

12. The reading problems of college students.
13. Comparative scholastic standing of athletes.
14. Prerequisite courses.
15. Student self-appraisal.
16. Coöperation in the land-grant college survey.
17. The characteristics of superior college teachers.
18. Instruction in clinical medicine.

The spirit of the committee's work has been one of inquiry. Here is an important problem needing investigation; the best possible scientific techniques should be used in its solution; new methods must be invented if necessary, and the study carried thru to a point making it worthy of publication as a valuable contribution to our knowledge of college education.

It may be useful to relate specifically certain of the Minnesota studies which have reached the point of publication. The first of these relates to the effectiveness of instruction in classes of different sizes.

This investigation has been pursued during a period of three years. Investigation has been made of the trends in class size over a six-year period since 1920 and the records which students make in classes of different sizes. This investigation has been supplemented by extended questionnaire studies among the members of the faculty and students of the university. More important than these studies, however, has been the experimental work which, to quote from Professor Hudelson's manuscript report of the sub-committee, has "involved 59 fully or semi-controlled experiments involving 108 classes under 21 instructors in 11 departments in 4 colleges of the University of Minnesota. The experiment involved 5,879 students—4,025 in large classes and 1,854 in small. Direct man-to-man comparisons were made upon 1,288 pairs of students, carefully matched as to intelligence and scholarship. The final criterion was student achievement as measured by tests and examinations, most of which were objective.

"In 46 of the experiments, or 78 per cent, a more or less decided advantage accrued to the paired students in the large sections. Only in the remaining 13, or 21 per cent, was there any advantage in favor of the smaller classes. At every intelligence level the paired students in the large sections excelled their mates in the small. Except at the very extreme, where results favored the superior students, the relative gain in achievement was no greater for the higher levels of intelligence than for the lower. It would seem that except in the case of a few exceptionally capable and zealous students there is considerable waste of intelligence in both large and small classes. At every scholarship level the paired students in the large sections outstripped their mates in the small. The excellent scholars profited somewhat more from large classes than did their less conspicuous classmates. Large classes seem to have spurred every type of student to higher levels of attainment.

"*Conclusions.* Since small classes, other things being equal, greatly increase cost of instruction, they must be justified on other grounds. In the light of the consistent results of this investigation, it would seem

that it will be extremely difficult to justify them on the ground of superior student achievement."

The final report is now available. The conclusions of the Sub-committee as stated in the report are as follows:

"In the light of all available evidence, class size seems to be a relatively minor factor in educational efficiency, measured in terms of student achievement. What the major factors are we do not know; to be determined they must be isolated, controlled, and tested one at a time. Neither do we know whether there are important educational outcomes other than achievement accruing, or at least accruable, only from small classes or whether experiments by other instructors would produce similar results. All that can be said is that, in the courses investigated, the effect of class size upon student achievement is, in the opinion of the Sub-Committee, too slight to warrant the cost of small classes.

"It hardly seems reasonable that the same techniques of instruction are equally suitable to all sizes of classes; yet few efforts have been made studiously to adapt teaching methods to class size. Conclusions, therefore, are in the main based upon a comparison of traditional small-class methods versus slightly modified small-class methods. It may be that efficiency of instruction in small classes is now far below the maximum and that attention to technique could push the level of effectiveness above the maximum for large classes. What may be needed is a complete breaking away from tradition and the devising of instructional methods suited to the demands of modern higher education. The general coercive policies which prevail in colleges and universities may actually be doing injustice in the name of education.

"Changes in class size policy, however desirable, are certain to be of such import and to involve so many other educational factors that they should be neither precipitously adopted, irrationally resisted, nor complacently ignored. They should, rather, be prepared for; for the necessary adaptations in budgeting, organization, buildings, curriculum, and instructional procedure cannot be effected overnight.

"Every teacher is morally obligated to contribute his part to educational efficiency. If he can teach, or learn to teach, larger classes with little or no loss of effectiveness to his students, neither prejudice, preference, nor tradition should deter him from contributing that much to educational economy; but if after a thorough, thoughtful, sincere trial he finds that he cannot, no amount of pressure should induce him to continue the attempt. He should, instead, contribute his part in other ways; for educational efficiency consists in each one's doing to his utmost what *he* can do best. If true teaching is less a matter of educating people and more a matter of giving them guidance and practice in educating themselves, large classes may prove to be ideal educational institutions.

"This investigation of class size is by no means exhaustive. Some of the issues involved have barely been raised and others have not even been broached. Before any of them can be definitely settled much long-continued and carefully-controlled experimentation will be necessary. It

is to be hoped that the present study may serve as a point of departure for such eminently worth-while research."

The second study is of a different sort and relates to the extra-curricular activities of college students. The scope of this study will be evident from an excerpt of the report of the committee under whose direction it was made.

"The Sub-Committee, working through a period of years, has had the coöperation of administrative officers and members of the faculty, of student organizations and individual students, and a considerable body of graduates of the University.

"The Committee report presents an interesting body of data gathered from all these sources. You will find here an extensive survey of what college students do other than attend classes and study, some indication of the effect of this outside activity on student achievement, the characteristics of student leaders, and a reflection of alumni opinion as to the relative values of their activities while in college. The authors of the report have attempted to present a body of factual material. They have used records furnished by 4,637 college students representing almost all the colleges of the University, 408 alumni, and 156 campus organizations. In dealing with special groups they have used data concerning 379 'prominent' students, 112 honor students, and 904 officers of campus organizations. Special attention is given to the relation between the intensity of extra-curricular activity and scholarship, the time spent by students in ways other than study, the 'death-rate' of campus organizations, and the 'carry-over' from student to alumni activity.

"The report interprets the facts conservatively but illuminatingly. As a whole, the study yields a body of information and conclusions that profoundly affect our understanding of the complex and vaguely appreciated matters of the non-scholastic aspects of student life. The significance of the report is such that all future students of this problem must take account of its findings."

Finally, we may note two new volumes dealing with science teaching at the college level. The first report covers the following experimental studies:

1. The relative efficiencies of different methods in teaching human anatomy.
2. The effect of different amounts of laboratory work in the teaching of human physiology.
3. The effect of lengthening the time given to laboratory work in the teaching of human physiology.
4. The following studies in the teaching of physics:
   a. The techniques for pairing students in physics for educational experiment involving preliminary testing, scaling of test items, the value of achievement in high school physics, the validities and reliabilities of tests and measures of achievement.
   b. The comparison of different groups of students in the field of mechanics and a continuation of the study of the effect of class size in the teaching of physics.

The second report covers an investigation in the curriculum in elementary botany and the relation of elementary botany to sequent courses in the College of Agriculture, Forestry, and Home Economics. The study involves an analysis of the content of numerous botanical courses, the testing of students in botanical knowledge, the construction and validation of tests for the several courses, and suggestions for the revision of numerous botanical curricula.

I shall take time for a statement of only one other project upon which we are working. I choose this one because of its intimate relation to the problems of college instruction, tho the study is yet in its initial stages. With the aid of a large committee of the university faculty we have set about a study of the characteristics of superior college teachers. As thus far developed, the method involves four lines of attack. First of all, we are making a study of the biographical literature relating to great teachers of the last hundred years—men like Huxley, Agassiz, Wayland, Hall, Hopkins, McCosh, and a long list of similarly conspicuous college instructors. What we are asking is: What did these men do to students and how did they do it? What traits and modes of behavior sufficed to leave behind them a long line of inspired disciples? The second phase of the study attempts to secure from men now living a description of more recent instructors of singularly great eminence. We are asking the students of men like Jordan, Armstrong, Childs, Sumner, Wilson, James, Bascom, and others to detail, as accurately as they may, the qualities and methods of the men they knew, the men whose teaching led them into a life of scholarship or into other useful life careers.

We are, also, seeking light upon the characteristics of superior teachers by the more direct method of the observation of superior teaching. Dr. F. W. Lathrop, who is the chief worker upon this project, has been at work developing a method for the objective recording of what transpires in a recitation period. He has hit upon a technique that is usable by a trained observer and that bids fair to give statistically reliable results. When the method for this part of the study is perfected, it is proposed to observe the classroom activities of certain admittedly good teachers on our own university faculties, and possibly also in other colleges.

A fourth device is the stenographic report of recitations, lectures, etc., a method which has already been successfully used in studies of instruction elsewhere.

The results of this study may not be prejudged, but already it is clear that the project is rich in possibilities. We may not discover the single factor that makes a teacher superior, for, as Dr. Mann has suggested, the qualities and activities of such teachers are varied, and possibly unique to the individual. To display something of this variety will in itself be a result of great interest and value, and this we shall certainly be able to do in a more objective and comprehensive way than it has yet been done.

In closing, I should like to stress again the point that we need in our colleges an experimental attack upon the problems of college teach-

ing. Few persons, whether in academic or educational departments, are in a position to set themselves up to give a course of a semester in length on how to conduct recitations in any particular college subject, and the effort that is being made in some places to establish formal courses for instruction in college methods is in danger of running ahead of the hounds. We need years of experimental work on the problem of college teaching, on the techniques of making curricula, on the methods of student marking and student examinations and student evaluation before we can really offer much that is sound and reliable in the way of courses in the teaching of college subjects.